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FOOD TECHNOLOGY ABSTRACTS

Vol. 29 No. 5
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FOOD
TECHNOLOGY
ABSTRACTS

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ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraaceti acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcalk, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-	equivmilli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	Poise
p	probability
Pa	pascal (N/M^2)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, µm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	E
Swedish	Sv

GENERAL

809

Arora (KL), Adhikari (K) and Verma (NK). **Cost estimation for the manufacture of Mellorine type frozen desserts.** *Beverage and Food World* 21(2); 1994; 15-17

The cost for the manufacture of Mellorine-type frozen desserts using groundnut oil and hydrogenated-fat was estimated and compared with milk fat ice cream. The cost of manufacturing Mellorine containing hydrogenated-fat and GMS was the lowest Rs. 1.04/100 ml. The cost was Rs. 1.09 when emulsifier was replaced with Tween-80. The cost of groundnut oil Mellorine using Tween-80 and GMS were Rs. 1.11 and 1.09/100 ml. Mellorine type frozen desserts were found to be cheaper by 17-21% as compared to ice cream (Rs. 1.32) using butter fat. SRA

810

Fromhold-Treu (I). **A survey on digital picture processing in food science. Part 5. Detection of lines and edges by local operators.** *Die Nahrung* 37(3); 1993; 193-203 (De)

Methods for detection of lines and edges with the aid of local operators play an important role in the field of image segmentation. Starting from the definitions of a line element and an edge element 2 kinds of mathematical descriptions for the line and edge detection will be shown. Two examples demonstrate the practical application. AA

811

Fromhold-Treu (I). **A survey on digital picture processing in food science. Part 6. Further local operators for the detection of lines and edges.** *Die Nahrung* 37(3); 1993; 204-213 (De)

Several gradient-operators are considered in a uniform description and their properties are studied. Related to the quality of the detected edges the operators differ only slightly. More important differences appear in sensitivity of noise and computer cost. If the pictures are not noisy the Roberts-gradient and the 3 x 3-average-difference-operator yield good results with low computer cost. AA

812

Fromhold-Treu (I). **A survey on digital picture processing in food science. Part 7. Detection of edges using information of direction.** *Die Nahrung* 37(3); 1993; 214-219 (De)

Most of the algorithms for edge- and line-detection use the amount of the gradient of the gray-level-function as a criterion for the presence of edge- and line-elements. If the gray-level-function in a square window is interpreted as a n x n-matrix of a n^2-dimensional vector-space then the orientation of the elements of this vector-space related to special subspaces can take as a new criterion. Furthermore 2 methods for noise discrimination in gradient pictures are described. AA

FOOD PROCESSING

813

Loaharanu (P). **Cost/benefit aspects of food irradiation.** *Food Technology* 48(1); 1994; 104-108

This article is a summary of the symposium working group's report and recommendations. Aspects covered are effectiveness and safety of food irradiation, controlling food-borne diseases, reducing food losses, expanding food trade, technology transfer, electron beam facilities and contract irradiators. CSA

814

Sunderland (R). **Continuous breading production by extrusion cooking.** *Cereal Foods World* 38(9); 1993; 685-688

The author compares breading production in conventional and extrusion processes and then traces the steps and components in the continuous extrusion process. CSA

FOOD PACKAGING

Packaging materials

815

Olafsson (G), Jagerstad (M), Oste (R), Wesslen (B) and Hjertberg (T). **Effects of different organic acids on the adhesion between polyethylene film and aluminium foil.** *Food Chemistry* 47(3); 1993; 227-233

Acetic, propionic, citric and lactic acid sol. (3% wt./wt.) were packed in LDPE/paper/LDPE/Al foil/LDPE envelopes and stored at room temp. for 4 wks. Acetic acid causing total delamination within a few days followed by a recovery back to 50% of the initial value after 2 wks confirmed earlier reports. Propionic acid showed total delamination of LDPE and foil after 8 days and remained the same for the rest of the period. The package in contact with citric acid, lactic acid and water did not show any marked change in adhesion or salt layer formation but both acetic and propionic acids formed salt layer. SD

FOOD ENGINEERING AND EQUIPMENT

816

Coonce (VM), Levien (KL) and Torres (JA). **Mathematical models for drying rates and quality indicator changes during barley malt kilning.** *Cereal Foods World* 38(11); 1993; 822-826, 828-830

Aspects dealt in this article are modeling malt temp. changes during kiln drying, modeling malt drying rates during kilning, indicators of barley malt quality (proteases, β-glucanases, diastases, colour), simulation of enzyme deactivation during kilning, modeling malt colour formation during kilning, dynamic modeling of drying processes and recent modeling studies. CSA

817

Dural (NH) and Hines (AL). **A new theoretical isotherm equation for water vapour-food systems: Multilayer adsorption on heterogeneous surfaces.** *Journal of Food Engineering* 20(1); 1993; 75-96

A new analytical isotherm equation that can be applicable to water vapour-food systems is reported. The model describes the multilayer adsorption on energetically heterogeneous surfaces by assuming that the local isotherm for a specific site is given by the GAB isotherm, and the distribution of energetically different sites is represented by a generalized exponential function of the new isotherm tested. Results showed that the model provides an accurate and simple description of the adsorption characteristics for heterogeneous adsorbents. BV

818

Califano (AN) and Zaritzky (NE). **A numerical method for simulating heat transfer in heterogenous and irregularly shaped foodstuffs.** *Journal of Food Process Engineering* 16(3); 1993; 159-171

Heat conduction during cooking of foodstuffs with heterogenous thermal properties was simulated, mainly for irregularly shaped geometries. A code employing boundary-fitted grids was implemented in a numerically conservative form (control vol. formulation). This technique consists of finding a numerical coordinate transformation which fits a regular grid to the domain of integration. With the grid as data, coeff. for a transformed differential equation are then obtained. The proposed model was experimentally verified on irregularly shaped pieces of beef containing a non uniform distribution of fat. Relative errors between predicted and measured temp. were less than 2%. The effects of heat transfer coeff. and temp. of the cooking medium on the temp. distribution during the process were analyzed. The influence of different fat patterns was also considered. AA

819

Desobry () and Hardy (J). **Modelling of the total water desorption rate from packaged moist food.** *International Journal of Food Science and Technology* 28(4); 1993; 347-359

This study deals with the modelling of total water desorption rate (TWDR) from moist food

in multilayer packaging. The TWDR detn. method is based on water content variations of an open or wrapped agar gel simulating high moisture content food (Camembert cheese). The packaging studied, widely used in the French cheese industry, is composed of 3 interacting layers (wax, paper, varnish). First, a simple paper was studied with diferent quantity of wax (0-6 gm^{-2}). Then, various quantities of varnish (from 0-45 gm^{-2}) were layered on the waxed paper. The interactions between all the packaging components and their effects on TWDR are shown and explained. The method allows calculation of the apparent water diffusivities, the water concn. and the a_w at each point in the packaging from Fick's and Henry's laws and water sorption isotherms. A model of water vapour transport from the centre of a moist food to atm. through the wrapping materials is proposed and validated. AA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

820
Bellion (IR) and Wedzicha (BL). **Effect of glycerol on the kinetics of the glucose-glycine-sulphite reaction.** *Food Chemistry* 47(3); 1993; 285-288

The kinetics of loss of sulphite species, S(IV), from mixtures of glucose, glycine and S(IV) were measured in aqueous sol. containing varying amounts of glycerol in the range 0-81.5% (w/w) corresponding to a_w in the range 1.0-0.45. The data are used to obtain rate constants for the S(IV)-independent and S(IV)-dependent reactions leading to the formation of 3-deoxyhexosulose in the early stages of the glucose-glycine reaction. The effects of a_w on values of these rate constants are discussed. AA

821
Sahbaz (F) and Somer (G). **The effect of citrate anions on the kinetics of cupric ion-catalysed oxidation of ascorbic acid.** *Food Chemistry* 47(4); 1993; 345-349

At 25°C, with 2.5 - 6.0 pH range, the rate of cupric ion-catalysed oxidation was of the first order with respect to ascorbic acid. The observed effects of pH and cupric ion concn. on the reaction rate indicate the formation of a transition complex between monoascorbate ion and Cu(II)-citrate. The catalytic ability order was Cu(II) > H_3ClCu^+ > $7HClCU^-$ > $ClCu^{-2}$. Hydrogen peroxide was also detected during the reaction. SD

822
Mathews (S), Singhal (RS) and Kulkarni (PR). **Some physicochemical characteristics of *Lepidium sativum* (haliv) seeds.** *Die Nahrung* 37(1); 1993; 69-71

The physical characteristics, proximate analysis, carbohydrate profile, swelling index and water holding capacity of *L. sativum* seeds commonly known as haliv, used traditionally in India in the diet of lactating women in the post-natal period is reported. AA

823
Acosta Artiles (A), Diaz Romero (C) and Hardisson De La Torre (A). **Concentration levels of metals in different types of vinegars.** *Die Nahrung* 37(1); 1993; 72-73

824
Lii (CY) and Lee (BL). **Heating A-, B-, and C-type starches in aqueous sodium chloride: Effects of sodium chloride concentration and moisture content on differential scanning calorimetry thermograms.** *Cereal Chemistry* 70(2); 1993; 188-192

The effects of moisture and NaCl content on the phase transitions of different granular starches were examined by differential scanning calorimetry. Samples were adjusted to starch-water wt. ratios of 1:4, 2:3 and 3:2 in NaCl concn. of 0, 1, 2, 3, 4, 5 M. The gelatinization temp. (GTs) of 7 starches increased and then decreased as the NaCl concn. increased. However, the salt effects on

starches of different X-ray diffraction patterns varied because of their different granular structures. The GTs of the B-starches with salt decreased to a level lower than that of the individual original starch, whereas the GTs of A-starches were always higher than those of their respective native samples. The increment of GT in the A-starch was also greater than that in the B-starch. The influence of NaCl on lotus tuber starch (C-starch) was a combination of the modes of A- and B-starches. The amylose content of starch did not affect the influence of NaCl or gelatinization. NaCl created similar effects on the endotherms in excess water content and on the first endotherm with limited water content. AA

825

Paik (JS) and Tigani (MA). **Application of regular solution theory in predicting equilibrium sorption of flavour compounds by packaging polymers.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 806-808

Equilibrium sorption values of model flavour compounds and polymers used in packaging were determined by immersing polymer samples in liquid flavour compounds. The equilibrium sorption values were normalized for crystallinity and concn. differences. The plot of ln S vs the squared difference between the solubility parameter of polymer and solvents $(\delta_1 - \delta_2)^2$ resulted in poor correlation. This seems to indicate that modifications are required in applying the Hildebrand-Scatchard concept of sol. for the prediction of flavour sorption by polymer packaging materials. Results indicate that the consideration of polymer chain configurations and more reliable δ values for polymers may improve the prediction. AA

Chemistry(Analytical)

826

Lin (JCC), Nagy (S) and Klim (M). **Application of pattern recognition technique to sensory and gas chromatographic flavour profiles of natural orange aroma.** *Food Chemistry* 47(3); 1993; 235-245

A trained panel evaluated 12 aroma descriptors and overall quality on a 7 point quantitative descriptive analysis (QDA) and separated samples into 6 categories as fruits, fresh-orange-like, flowery herbal-like, butter oil-like, pepper-like and fruity tea-like. Aroma constituents (32 peaks) were identified and quantified by GCMS. QDA and GC data were analysed for pattern recognition routines of ARTHUR and the category data by non-linear mapping (NLM). Feature weightings (variance and Fisher) indicated that 'overall quality' as the most discriminating power for sensory evaluation of good quality aroma. The GC data clearly separated aroma samples into groupings that were related to the categories previously separated by aroma panel and depicted by NLM. Ethyl acetate, acetal and ethyl butyrate featured high variance and Fisher weightage. SD

827

Scott (KJ) and Hart (DJ). **Further observations on problems associated with the analysis of carotenoids by HPLC-2.** *Food Chemistry* 47(4); 1993; 403-405

The chromatographic system to separate lutein, zeaxanthin, β-cryptoxanthin, lycopene and α- and β-carotene in which the analytical variation caused by column temp. on the elution time and elution profile was reduced by temp. control viz 20 - 22.5°C as optimum. SD

828

Kim (N), Kwon (DY), Hong (HD), Mok (C), Kim (YJ), Nam (YJ). **HPLC analysis of a back bone compound,**
β-benzyl-N-carbobenzoxy-L-aspartyl-D-alanine, of intense peptide sweetners belonging to L-aspartyl-D-alanine amides. *Food Chemistry* 47(4); 1993; 407-410

The most effective eluent composition and flow rate for HPLC assay were CH_3CN:0.2 M triethylamine-H_3PO_4(PH_3) in 1:1 ratio and 0.8 ml/min respectively. The optimum reaction time between silylated D-alanine and mixed anhydride in the synthesis of the backbone compound was 80 min. The method is simple, reliable, excellently reproducible and gives favourable recovery of the backbone compound of high purity standard. SD

829

Thompson (LJ), Densiton (DJ) and Hoyer (CW). **Method for evaluating package - related flavours.** *Food Technology* 48(1); 1994; 90-94

Investigation undertaken to develop an uncomplicated method of package evaluation that would describe the aroma and flavour characteristics as well as the intensity is dealt in this article. Comparison of the results among the resin manufactures, converters and processors and a scale calibrated to reference standards developed is also described. CSA

830

Sattar (A), Ahmad (N) and Khan (LA). **Potentiometric stripping analysis of selected heavy metals in biological materials.** *Die Nahrung* 37(3); 1993; 220-225

Different biological materials (BM) (edible oils, refined and unrefined cane and beet sugar and tea (black and green) leaves) were assayed for the heavy metals (Cd, Cu, Pb and Zn). The results revealed significant differences in heavy metal (HM) contents within each class of the BM ($P < 0.05$). Cd was not detectable in sugar samples. Among the oils, highest amounts of Cu (0.263 µg/g) and Pb (0.154 µg/g) were in corn oil and Zn in olive oil (3.01 µg/g) whereas Cd exhibited a narrow range (0.023 - 0.033 µg/g). The samples ofbeet-sugar generally contained higher levels of HM than cane-sugar. Black and green tea leaves contained 0.411 - 0.908 µg Cd/g, 6.500 - 9.220 µg Cu/g, 2.200 - 5.238 µg Pb/g, and 14.500 - 25.180 µg Zn/g. BV

831

McCluskey (S) and Devery (R). **Validation of chromatographic analysis of cholesterol oxides in dried foods.** *Trends in Food Science and Technology* 4(6); 1993; 175-178

This review addresses the criteria necessary for full validation of chromatographic methods used in cholesterol oxide analysis. Aspects covered are analysis of cholesterol oxidation products (COPs), criteria for the validation of chromatographic assay, validation procedures (specificity, precision, accuracy, linearity, robustness, recovery) and common pitfalls in the analysis of COPs. 14 references. BV

832

Sundfeld (E), Yun (S), Krochta (JM) and Richardson (T). **Separation of cholesterol from butteroil using quillaja saponins. 1. Effects of pH, contact time and adsorbent.** *Journal of Food Process Engineering* 16(3); 1993; 191-205

833

Sunfeld (E), Krochta (JM) and Richardson (T). **Separation of cholesterol from butteroil using quillaja saponins. II. Effects of temperature, agitation and concentration of quillaja solution.** *Journal of Food Process Engineering* 16(3); 1993; 207-226

The processes and controls studied (1) W, (2) R, (3) A, (4) R+A, (5) R+W. The last step in all the processes and controls was the separation of fat phase, after which analyses were made. ANOVA indicated that the adsorption control process did not yield any significant cholesterol reduction over the water control. All other processes resulted in significant cholesterol separation in the order R+A > R+W > R. The levels of cholesterol reduction achieved by the R, R+W and R+A processes were significantly affected by concn. of quillaja sol. and temp.; the level of agitation had no significant effect over the range investigated. Quillaja powder residue was present in the fat phase after reaction (2) but both adsorption and washing procedures significantly reduced it. RN

FOOD MICROBIOLOGY AND HYGIENE

Microorganisms

834

Sajilata (M), Nayak (RR), Singhal (RS) and Kulkarni (PR). **Microorganisms as indices of food quality.** *Beverage and Food World* 21(2); 1994; 9-11

Indices of different food classes such as water, blanched vegetables, meat and poultry products, dairy products, fluid milk, raw and pasteurised, concentrated and dry milk products, butter, cheese and other fermented dairy products, ice cream and related products,

fish and shell-fish are described in the article. SRA

835

Xavier (IJ) and Ingham (S). **Increased D-values for *Salmonella enteritidis* resulting from the use of anaerobic enumeration methods.** *Food Microbiology* 10(3); 1993; 223-228

D-value (decimal reduction time) was determined for *Sal. enteritidis* ATCC 4931 at 52, 54, 56 and 58°C in skim milk and casein peptone soymeal peptone broth supplemented with 0.6% yeast extract (CASO-YE). Four combinations of heating conditions and survivor enumeration method were tested for each medium: (1) pre-reduced heating medium with anaerobic enumeration (PAn); (2) non-reduced heating medium with anaerobic enumeration (NAn); (3) non-reduced heating medium with a fluid thioglycollate overlay enumeration method (NOverlay); (4) non-reduced medium with aerobic enumeration (NAer). The D-values obtained using PAn, Nan, and NOverlay were significantly ($P < 0.05$) greater than those obtained using NAer for both CASO-YE and skim milk at each of the temp. tested. For a given temp., the differences in D-values between the first 3 methods were usually not significant. Anaerobic enumeration methods may be important in evaluating the microbiological safety of lightly heated foods packaged under low-oxygen conditions. AA

836

EHEDG. **A method for the assessment of bacteria tightness of food processing equipment.** *Trends in Food Science and Technology* 4(6); 1993; 190-192

The procedure for assessing the bacteria tightness of food-processing equipment recommended by the Test Methods subgroups of the EHEDG are summarised. BV

Fungi

837

Ros (JM), Saura (D), Salmeron (MC) and Laencina (J). **On the response under different thermal treatments of the thermostable endopolygalacturonase produced by *Rhizopus nigricans*.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(4); 1993; 356-359

The influence of temp. and thermal treatments on the endopolygalacturonase activity produced by *R. nigrocans* was studied. The optimum temp. was at 50°C. The enzymatic preparation also showed the highest endo pattern at this temp. This endopolygalacturonase showed high thermostability between 90-100°C and a bimodal behaviour in relation to the thermal treatments, because the enzyme was strongly inactivated at 70°C. When the enzyme was treated at 90°C and 70°C consecutively, the inactivation at 70°C was smaller. AA

Aspergillus flavus

838

Ellis (WO), Smith (JP), Simpson (BK) and Ramaswamy (H). **Effect of inoculum level on aflatoxin production by *Aspergillus flavus* under modified atmosphere packaging (MAP) conditions.** *Food Microbiology* 10(6); 1993; 525-535

Regression analysis of the data showed that inoculum level, a_w, storage temp. and head space O_2 has a significant effect on both growth and production of aflatoxin by *Asp. flavus*. Max. growth of 4.17 mg g^{-1} occurred at an inoculum level of 10^4 spores/plate, an a_w of 0.95, storage temp. of 20°C and 15% headspace O_2. Max. aflatoxin level of 3.45 μg^{-1} occurred at 10^3 inoculum level/plate, 0.96 a_w, storage temp. of 25°C and 10% O_2 level. Packaging under completely anaerobic conditions using Ageless O_2 absorbents inhibited both growth and production of aflatoxin by *Asp. flavus*, irrespective of the inoculum levels and storage temp. used. SRA

Mushrooms

839

Fasidi (IO) and Kadiri (M). **Effect of sporophore maturity on chemical composition of *Volvariella esculenta* (mass) singer, a Nigerian mushroom.** *Die Nahrung* 37(3); 1993; 269-273

The "egg", "elongated" and "mature" stages of *Vol. esculenta* (Mass) SINGER sporocarps were analysed for their chemical composition. The "egg' stage was found to contain the highest amount of nutrients and the "elongated" stage the lowest. The "egg" stage was rich in protein, amino acids, lipid, crude fibres, glycogen, sugars, K, Mg, Ca and P than the "elongated" and "mature" sporocarp stages. At any sporocarp stage, the pileus contained higher amounts of moisture, sugars, ash, lipid, protein, amino acid, P, Fe, Cu and Zn than the stipe while the stipe contained more dry matter, crude fibre, Ca and Mg. BV

840

Papaparaskeva-Petrides (C), Ioannides (C) and Walker (R). **Contribution of phenolic and quinonoid structures in the mutagenicity of the edible mushroom *Agaricus bisporus*.** *Food and Chemical Toxicology* 31(8); 1993; 561-567

The objectives of this work were to establish the contribution of agaritine in the mutagenicity of ethanolic extracts from *Agaricus bisporus* and to examine the possible involvement of phenolic and quinonoid compounds in the mutagenic response to mushrooms. The mutagenic profile of agaritine in the Ames test, in the absence of an activation system, was different from that of the mushroom ethanolic extracts. Incorporation of rat hepatic cytosolic fractions as the activation system increased the mutagenicity of the mushroom ethanolic extracts in *Salmonella typhimurium* strain TA 104 but did not influence the mutagenicity of agaritine. It was concluded that agaritine is not the principal mutagenic component in the mushroom. The cytosol-induced mutagenicity of the mushroom extracts required NADPH, and was inhibited by dicoumarol and menadione. Moreover, the mutagenic response in the presence of cytosolic fractions was inhibited by superoxide dimutase, catalase, glutathione and dimethyl sulphoxide, thus implicating reactive oxygen species. Finally, tyrosine, the enzyme converting mushroom phenols to quinones, increased the mutagenicity of the mushroom extracts. Collectively, the above results indicate that phenolic and quinonoid compounds, presumably through the generation of reactive oxygen species, may play a significant role in the mutagenicity of mushroom extracts. AA

Yeasts

Saccharomyces cerevisiae

841

King (VA-E). **Studies on the control of the growth of *Saccharomyces cerevisiae* by using response surface methodology to achieve effective preservation at high water activities.** *International Journal of Food Science and Technology* 28(5); 1993; 519-529

Water activity (0.93 - 0.97), pH (4 - 6), sorbic acid concn. (0 - 50 p.p.m.) were combined to study their effects on the growth of *Saccharomyces cerevisiae*. A 3-variable and 3-level design method, analysed by response surface methodology (RSM), was used. These factors were found to be significantly effective on the reciprocal of lag time, the growth rate, and the max. population of the yeast grown in lab. media. Fitted polynomial regression equations were plotted using a graphing software package. Inhibitory conditions of these 3 variables to the growth were determined based on these graphs. Results showed that *S. cerevisiae* could be inhibited at a_w 0.94 and pH 4 with sorbic acid concn. of 25 p.p.m. The predicted conditions of inhibition and the experimental values were consistent. This verified the adequacy of these predicted models. RSM was found to be appropriate for the study of food microbial growth only if the selection of the region of operating conditions was adequate. AA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

842

Spillane (WJ), Sheahan (MB) and Ryder (CA). **Synthesis and taste properties of sodium disubstituted phenylsulfamates. Structure-taste relationship for sweet and bitter/sweet sulfamates.** *Food Chemistry* 47(4); 1993; 363-369

Forty ring disubstituted phenylsulfamate have been synthesized as their Na salts. These compounds display a var. of tastes including sweet, bitter and sour. Seven of them gave a predominantly sweet taste, 12 displayed a bitter taste followed by a sweet aftertaste, 11 showed predominant bitterness, 5 sourness and 5 gave and aniline- or hydrocarbon-like taste and were not assessed further by the panellists. A plot of z (width of molecule, measured using Corey-Pualing-Koltun (CPK) models) vs first-order molecular connectivity, $^1x^v$ placed the seven predominantly sweet compounds on the line described by $z = 2.27\ ^1x^v - 0.158$. Summation of Hammett sigma (σ) values for the X and Y substituents gives Σ σ, and with these the following structure-taste relationships were derived. Predominant sweetness: Σ:σ greater than or equal to 0.6, V_{CPK} less than or equal to 300 A^3 and a meta-electron with drawing substituent, no *para*-substituent. Bitter/sweet aftertaste: Σ σ less than or equal to 0.22, V_{CPK} less than or equal to 300 A^3. Some of the starting disubstituted anilines have been reported to be sweet and sulfamation modifies or destroys this sweetness. This is also discussed. AA

Colorants

843

Thakur (BR) and Arya (SS). **Stability of sunset yellow FCF and tartrazine in liquid model food systems.** *Die Nahrung* 37(1); 1993; 15-19

Effect of various preservatives, sugar, ascorbic acid and light on the stability of sunset yellow and tartrazine was studied. While SO_2 enhanced the rate of degradation of sunset yellow, it stabilized tartrazine in aqueous model systems. At 30 and 45 % sugar levels, the rate of degradation of both sunset yellow and tartrazine was practically same in the presence of benzoic acid and sorbic acid. At 15% sugar level, the rate of degradation of tartrazine was slightly higher in the presence of sorbic acid. Incorporation of ascorbic acid enhanced the degradation of both sunset yellow and tartrazine and its effect was considerably higher in the presence of light. Increase in sugar concn. enhanced the stability of both the dyes, but light enhanced their degradation. AA

Emulsifiers

844

Eydt (AJ). **Formulating reduced-fat foods with polyglycerol ester emulsifiers.** *Food Technology* 48(1); 1994; 82-83, 140

The article describes the properties and benefits of polyglycerol esters and focusses on a study demonstrating the advantages of the ingredient in reduced-fat creamy bakery fillings. CSA

CEREALS

845

Pokorny (J), Voldrichova (I), Kminek (M), Palatova (M) and Holas (J). **Water adsorption on extruded cereal products.** *Die Nahrung* 37(1); 1993; 82-84

846

Ranhotra (GS), Gelroth (JA) and Eisenbraun (GJ). **Correlation between chopin and AACC methods of determining damaged starch.** *Cereal Chemistry* 70(2); 1993; 236-237

Damaged starch (DS) values were determined in 58 commercially produced patent flours by the enzymatic lab. method (AACC), for all flours, averaged 7.5%; those obtained by the Chopin method (rapid iodometric method using the recently introduced Chopin SD4 instrument) averaged 5.6%. The correlation value was 0.90. For the Chopin method, recalibration of the instrument to flours with known DS levels may be necessary to improve agreement between the 2 methods of determining DS. BV

847

Loewe (R). **Role of ingredients in batter systems.** *Cereal Foods World* 38(9); 1993; 673-677

Highlights the processing considerations and quality factors in batter-coated products, discusses the general roles of individual ingredients (shortening and oil, egg and milk products, gums, starches, flavourings and seasonings) and the importance of their interactions in batter system. CSA

848

Moskowitz (HR). **Consumer-designed concepts for cereals.** *Cereal Foods World* 38(11); 1993; 811-816

Traditional methods of concept development and testing and concept optimization via conjoint measurement is discussed. A case history of ready-to-eat cereal for development of consumer-designed concepts involving various steps such as elements, restrictions, experimental design, consumer evaluations, building the model, segmenting consumers, identification of successful elements and creating new concepts is explained in this article. CSA

849

Dural (NH) and Hines (AL). **Adsorption of water on cereal-bread type dietary fibers.** *Journal of Food Engineering* 20(1); 1993; 17-43

A study involving the water sorption characteristics of cereal-bread type food fibers was conducted, using a gravimetrical adsorption apparatus. Water adsorption data for 4 dietary fibers (DF), corn bran, wheat bran, oat fiber and rice fiber, were measured at 278, 288, 298 and 310 K. The results showed that the adsorption of water vapour on these fibres are primarily due to physical forces, and all fibres investigated exhibited energetically heterogeneous surfaces. It was found that the distribution of the major components of the DF has an impact on the fiber's water sorption capacity. The isotherm data were correlated by using the BET and GAB multilayer adsorption models. The BET equation gave accurate correlations for up to 35 to 40% of the saturation pressure, while the GAB equation provided much better correlation of the data for the higher relative pressures. AA

850

Ferrero (C), Martino (MN) and Zaritzky (NE). **Effect of freezing rate and xanthan gum on the properties of corn starch and wheat flour pastes.** *International Journal of Food Science and Technology* 28(5); 1993; 481-498

The effects of freezing rate on exudate production, rheological behaviour, ice crystal size, and starch retrogradation of corn starch and wheat flour pastes (10% w/w) with and without xanthan gum (0.3% w/w) were studied by means of capillary suction, rotational viscometry, indirect microscopy, and differential scanning calorimetry (DSC). Higher freezing rates preserved textural characteristics and produced less exudate. In corn starch pastes, rates < 1 mm h^{-1} caused a marked spongy structure, undesirable for a sauce-like product, but only a slightly spongy structure in wheat flour pastes. Xanthan gum addition maintained the smoothness characteristic of the unfrozen pastes, avoiding amylose retrogradation. However, effects on ice crystal formation and amylopectin retrogradation were not observed. Although high freezing rates are mostly recommended, low levels of xanthan gum maintained quality characteristics even at low freezing rates, decreasing equipment cost. AA

Buckwheat

851

Amarowicz (R), Okubo (K) and Kunita-Glazewska (H). **Adsorption of bile salts by buckwheat fibre.** *Die Nahrung* 37(1); 1993; 66-68

Rice

852

Marshall (WE), Wadsworth (JI), Verma (LR) and Velupillai (L). **Determining the degree of gelatinization in parboiled rice: Comparison of a subjective and an objective method.** *Cereal Chemistry* 70(2); 1994; 226-230

Lemont and Tebonnet long-grain rice samples were parboiled either conventionally or by microwave to different degrees of starch gelatinization. The degree of gelatinization was determined by an objective method (differential scanning calorimetry) and by a subjective rice-grading method that yielded the % of translucent kernels in a given sample of parboiled rice. A linear correlation was found between the 2 methods for both var., which suggested that the grading procedure could be used to estimate the degree of gelatinization once a calibration curve was established. In addition, the degree of gelatinization, as determined by differential scanning calorimetry, was compared with head rice yield. The relationship between the 2 variables was nonlinear, and max. head rice yield for both Lemont and Tebonnet was achieved when the starch was about 40% gelatinized. The results indicate that extensive starch gelatinization (extensive parboiling) is not necessary to obtain max. head rice yields. AA

853

Sarkar (RK), Nanda (BB), Dash (AB) and Lodh (SB). **Grain characteristics and cooking quality of aromatic and non-aromatic, long and slender varieties of rice (*Oryza sativa*).** *Indian Journal of Agricultural Sciences* 64(5); 1994; 305-309

12 long and slender rices (*O. sativa* L.) including 9 aromatic and 3 non-aromatic were studied to identify superior genotypes with high recovery of head rice. High density grain % showed recovery of head rice. High density grain % showed significant positive association with 1000-grain wt., hulling, milling and head rice recovery. Basmati 385 and Gaurav among the scented var. and Hatipanjari among the non-scented var. were superior to others based on the physical appearance, amylose content, alkali value, gel consistency and cooking quality (water uptake, kernel length and breadth after cooking and vol. expansion) and these could be used as donors in rice breeding programme for improving quality. KAR

Rice bran

854

Takano (K). **Mechanism of lipid hydrolysis in rice bran.** *Cereal Foods World* 38(9); 1993; 695-698

The article attempts to clarify the decomposition mechanism of rice bran lipids and explains the findings. Aspects covered are the changes in lipids in rice bran, lipid decomposing enzymes (lipases, phospholipases) in rice bran, properties of rice bran spherosomes, disintegration of spherosome and lipid decomposition. CSA

Ryes

Rye flour

855

Wannerberger (L) and Eliasson (A-C). **Differential scanning calorimetry studies on rye flour-milling streams.** *Cereal Chemistry* 70(2); 1993; 196-198

The thermal behaviour of rye flour-milling streams was studied with differential scanning calorimetry. The differential scanning calorimetry-thermogram of the flour stream with the lowest levels of proteins and damaged starch showed a double endotherm and was very similar to that found for the gelatinization of starch at the actual water content. The thermogram of the flour with the highest protein content and the highest amount of damaged starch was quite different and showed one broad symmetric endotherm. It could be concluded that the milling process affects the interaction between the crystalline regions and the amorphous parts in the starch granules. The results showed that an increase in gelatinization onset temp. (T_o) and peak max. (T_m) occurred with an increased level of damaged starch. This was related to a change from a double to a single endotherm. Both T_o and T_m increased with an increased level of protein. The gelatinization enthalpy (ΔH) increased with an increased level of starch damage and with increasing protein content, but the differences in ΔH between milling streams were small. AA

856

Olama (ZA), Hamza (MA), El-Sayed (MM) and Abdel-Fattah (M). **Purification, properties and factors affecting the activity of *Trichoderma viride* cellulase.** *Food Chemistry* 47(3); 1993; 221-226

Cellulases produced by *Trichoderma viride* grown on wheat bran were fractionated by ammonium sulphate (50%) and purified by chromatography on DEAE-Sephadex A50 followed by CM-Sephadex C50. The overall purification method showed a protein reduction of 99.8% of the original protein content of the culture filtrate. On the other hand the specific activity was increased about 228-fold. Amino acid analysis of the purified enzyme showed that glycine was the predominant one followed by glutamic acid, serine, alanine and leucine. Cysteine and tyrosine were the least common amino acids. Electrophoresis by Disc-PAGE showed that the purified enzyme was homogenous since it gave only one distinctive band. The enzyme had a MW of 58000 as indicated by SDS-PAGE. The isoelectric point of the enzyme was 5.7. The cellulolytic activity was directly proportional to the enzyme concn. and was substrate-dependent. The max. enzyme activity was found at pH 5 when incubated at 45°C for 30 min. AA

857

Clawson (AR) and Taylor (AJ). **Chemical changes during cooking of wheat.** *Food Chemistry* 47(4); 1993; 337-343

Maillard reaction occurred when wheat was heated as evidenced by decrease in reducing sugars, amino acids and production of water and indicated no direct link between Maillard reaction or production of water and colour development. Large number of reactions and interactions occurred with ground wheat, making it extremely difficult to determine the Maillard reaction. SD

858

Lim (S) and Seib (PA). **Preparation and pasting properties of wheat and corn starch phosphates.** *Cereal Chemistry* 70(2); 1993; 137-144

Wheat and corn starches were phosphorylated in a semidry state at 130°C with 5% (based on dry starch) sodium tripolyphosphate (STPP) and/or 2% sodium trimetaphosphate (STMP). All phosphorylation reactions were done using 5% sodium sulphate and adjusting the initial reaction pH by adding aqueous NaOH or HCl to the prereaction slurries. As reaction pH was increased from 6 to 11, the degree of phosphorylation decreased 40-50% with STPP, whereas it increased 100% with STMP. At an initial reaction pH of 10 with STPP, a wheat starch phosphate was obtained with 0.22% P (including 0.05% P from phospholipids), and its pasting properties showed optimum thickening power with shear stability when cooked at 95°C. The best corn starch phosphate, judging from its paste properties, was obtained at an initial pH of 11 and STPP and contained 0.16% P (including 0.02% from lipid). When corn or wheat starch was heated with a mixture of 5% STPP and 2% STMP, the best product when pasted at 95°C was obtained at the initial reaction pH of 9.5. Paste clarity of the phosphorylated starches indicated that cross-linking accelerated rapidly above pH 8 with STMP but above pH 10 with STPP. AA

859

Lim (S) and Seib (PA). **Location of phosphate esters in a wheat starch phosphate by ^{31}P-nuclear magnetic resonance spectroscopy.** *Cereal Chemistry* 70(2); 1993; 145-152

Phosphate esters of D-glucose, methyl α-D-glucopyranoside, and maltose, as well as the α, γ-limit phosphodextrins from native potato starch (degree of substitution [DS] 0.0033) and phosphorylated amylose (DS 0.016) served as model compounds in ^{31}P-nuclear magnetic resonance experiments to locate the phosphate groups on a phosphorylated wheat starch (DS 0.012). The α, γ-limit phosphodextrins were isolated by ion-exchange chromatography after exhaustive digestion of amylose or starch phosphates with *Bacillus amyloliquifaciens* α-amylase followed by *Aspergillus niger* glucoamylase. The endogenous orthophosphate groups on potato starch were confirmed to be the 6- and 3-esters.

The wheat starch phosphate, prepared by heating starch with sodium tripolyphosphate under semidry conditions at an initial pH of 6, contained mainly 6-monophosphate esters along with lower levels of 3- and probably 2-monophosphates. The wheat starch phosphate contained orthophosphate groups at the nonreducing ends of starch molecules, whereas endogenous phosphate esters in potato starch occur on inner anhydroglucose units. AA

860

Rogers (DE), Hoseney (RC), Lookhart (GL), Curran (SP), Lin (WDA), Sears (RG). **Milling and cookie baking quality of near isogenic lines of wheat differing in kernel hardness.** *Cereal Chemistry* 70(2); 1993; 183-187

Two sets of near-isogenic lines of wheat were milled on a modified Barbender Quadrumat Senior experimental mill and were identified as being either hard or soft. Those identifications were made during milling. The resulting flours were tested for starch damage, presence of the 15-kDa starch granule protein, and sugar-snap cookie spread. The 19 lines derived from Falcon, 10 hard and 9 soft, had acid-polyacrylamide gel electrophoresis (A-PAGE) patterns of gliadins identical to each other and to those of Falcon. Likewise, the 11 lines derived from Heron, 6 hard and 5 soft, had A-PAGE patterns identical to each other and to those of Heron. As expected, the A-PAGE patterns were genotypic and not related to the hardness or softness characteristic. Milling and baking parameters correlated highly with classification of the flours as being hard or soft, rather than with classification according to the flour's gliadin (A-PAGE) pattern. AA

861

Shiiba (K), Yamada (H), Hara (H), Okada (K) and Nagao (S). **Purification and characterization of two arabinoxylans from wheat bran.** *Cereal Chemistry* 70(2); 1993; 209-214

In this study, water-soluble hemicellulose (WSH) was prepared in quantity from wheat bran by a new preparation method. Finally, to clarify not only their nutritive effect but their effect on rheological behaviour of doughs, arabinoxylans were purified from this WSH. They were characterized and their structure was investigated. BV

862

Kruger (JE) and Hatcher (DW). **A sensitive kinetic microassay for the determination of wheat α-amylase.** *Cereal Chemistry* 70(2); 1993; 234-235

This article describes a method using a kinetic microplate reader, which was assessed as a potential replacement. It is based on a principle similar to that of the modified AACC method 22-07 method but overcomes some of the limitations. Using this method, enzyme-catalysed rates of decreases in turbidity of β-limit dextrin substrate were found to be satisfactorily monitored simultaneously in 96-well microtiter plates. BV

863

Olewnik (M) and Kulp (K). **Factors influencing wheat flour performance in batter systems.** *Cereal Foods World* 38(9); 1993; 679-684

Factors [type of flour (soft or hard), protein levels in each type of flour, starch damage, supplementation of flours with amylolytic (cereal and fungal) and proteolytic enzymes, and the addition of oxidants (potassium bromate and iodate) and of reducing agents (L-cysteine and sodium bisulphite) affecting the performance characteristics of wheat flour is evaluated in flours, batters and fried coatings, and the results suggest some criteria that should be considered when selecting flours to be used in batter systems. CSA

864

Balint (L), Momirovic (J), Horvatic (M) and Vedrina (I). **Quantitative relations between farinogram area and new extensogram characteristics of wheat flour.** *Die Nahrung* 37(3); 1993; 234-240

In the analysis of farinograph curves, it has been determined that the farinograph area is a very reliable indicator of the quality of wheat flour, if it has been measured 12 min from the achievement of the max. In such a way, the dough development time, which can

considerably influence the size of the farinograph curve, if it has been measured 15 min after the farinograph has been set in motion, has been eliminated. Quantitative relations between one of the most important characteristics of the farinogram - the farinogram area, and the determined dough characteristics related to dough quality which can be registered by means of the extensogram, have been determined: $A_{far} = k' E^2/A$, where A_{far} = farinogram area measured 12 min from the achievement of the max., E = dough extensibility, A = area of the extensogram, k' = represents the farinographic area when the ratio unit value is E^2/A, k' = 4.18 and standard deviation s = 0.214. This determined relation gives a new approach to the farinograph curve interpretation and stresses the new importance of the farinograph as an instrument for physical testing of wheat flour quality. AA

865

Arun Kumar (GC). **Treatment of screenings.** *Indian Miller* 24(5); 1994; 23-27

This article suggests various means to increase the profitability of the operations; viz treating screenings of wheat on day to day basis; taking major portion of screening directly for treatment to save labour, reduction of storage area for total screening to minimise cross infestation, and mixing the screening with bran. SD

866

Wang (S), Casulli (J) and Bouvier (JM). **Effect of dough ingredients on apparent viscosity and properties of extrudates in twin-screw extrusion-cooking.** *International Journal of Food Science and Technology* 28(5); 1993; 465-479

A capillary-type viscometer was used in a twin-screw extruder to measure the apparent viscosity of cooked-extruded wheat-flour dough with various ingredients: lecithin, palm oil, sucrose, whey, NaCl and bran. The effects of concn. of these ingredients on dough rheology and physical properties of extrudates (apparent density, expansion ratios, mechanical, and crispness properties) were measured. The role of ingredients was discussed in terms of their physico-chemical effect on biopolymer conversion. The correlations between apparent viscosity of dough and physical properties of extrudates were developed. AA

Wheat starch

867

Bechtel (DB), Zayas (I), Dempster (R) and Wilson (JD). **Size-distribution of starch granules isolated from hard red winter and soft red winter wheats.** *Cereal Chemistry* 70(2); 1993; 238-239

MILLETS

Corn

868

Mannheim (A) and Cheryan (M). **Water-soluble zein by enzymatic modification in organic solvents.** *Cereal Chemistry* 70(2); 1993; 115-121

Water-soluble zein was produced using a dual-phase, sequential enzymatic modification and ultrafiltration. Zein was first partially hydrolyzed in an organic solvent by a protease, followed by an aqueous phase hydrolysis with the same protease. Ultrafiltration of the reaction mixture with a 10,000 and/or a 30,000 mol. wt. cut-off membrane yielded fractions with an av. of 5,400 Da. A significant improvement in certain functional properties of zein was observed, controlled largely by the degree of hydrolysis (DH). Solubility increased from 0% for the unmodified zein to 99% for enzyme modified (EM) and ultrafiltered zein. At less than DH20, solubility was also a function of pH and membrane pore size. Foaming properties were affected by DH, membrane pore size, and pH of measurement. At a a_w of 0.97, moisture sorption was 2.6 g of water/g of solids for the EM and ultrafiltered hydrolysates, compared to < 0.25 g of water/g of solids for unmodified zein. AA

869

Karahadian (C) and Jhonson (KA). **Analysis of headspace volatiles and sensory characteristics of fresh corn tortillas made**

from fresh masa dough and spray-dried masa flour. *Journal of Agricultural and Food Chemistry* 41(5); 1993; 791-799

Headspace volatiles from nitrogen-purged slurries of commercially prepared fresh tortillas, fresh masa dough, and spray-dried masa flour dough were collected onto Tenax GC. Ether-eluted concentrates were separated by fused silica capillary GC and identified by MS, retention indices (I_E), and odour quality of eluting peaks. Six pyrazines that contribute to the roasted, nutty and green character of cooked corn products were detected in fresh masa dough, whereas 12 pyrazines were identified in dough made from spray-dried masa flour. 2-Acetyl-1-pyrroline and 2-(methylimino)-3-butanone, which contributed popcorn-like and corn chip-like aromas respectively, were tentatively identified in spray-dried-products. Descriptive sensory analysis of commercially prepared tortillas from fresh masa dough and spray-dried masa flour indicated that tortillas made from spray-dried flours exhibited stronger roasted, cooked corn flavours and aromas. AA

Corn starch

870

Rodis (P), Wen (L-F) and Wasserman (BP). **Assessment of extrusion-induced starch fragmentation by gel-permeation chromatography and methylation analysis.** *Cereal Chemistry* 70(2); 1993; 152-157

Three commercial corn starches (high-amylose, amylopectin-enriched, and corn meal) were extruded under various conditions and analyzed for changes in solubility, mol. size distribution, and linkage content. Each of the extruded starches dissolved in dimethyl sulfoxide at a faster rate than unprocessed material. Gel-permeation chromatography confirmed the occurrence of starch fragmentation. Methylation analysis showed only small changes in linkage distributions, suggesting that under the conditions tested, the total number of fragmentation points is small relative to the total number of glycosidic linkages in starch. Furthermore, the absence of glucose or maltodextrins indicates that fragmentation sites are largely internal, rather than adjacent to the reducing or nonreducing termini of the amylopectin molecule. AA

871

Gruchala (L) and Pomeranz (Y). **Enzyme-resistant starch: Studies using differential scanning calorimetry.** *Cereal Chemistry* 70(2); 1993; 163-170

Factors governing the formation of enzyme-resistant starch (RS) from high-amylose maize starch under lab. conditions were investigated. Those factors studied included sample size, gel dimensions, number of heating-cooling cycles, and cooling conditions. Cooling to about 20°C produced RS with higher enthalpies than cooling to 4°C or freezing at about -20°C. Freeze-drying was not superior to oven-drying. Heating of resuspended RS increased enthalpies. RS could be stored at -20°C odour-free for at least 8 months. A rancid odour developed within several wks of storage at room temp. Thermal characteristics of RS, as measured by differential scanning calorimetry (DSC), were sample-size-dependent. To determine the stability of RS, samples were preheated under conditions similar to those in baking bread: temp. of 100 and 200°C, both dry and with water. Preheating RS, especially with water, at 200°C resulted in a disintegration of the RS. No significant changes in DSC characteristics took place during preheating at 100°C. The presence of gluten or wheat starch in RS blends (as they might exist in bread) reduced measurable DSC enthalpies. AA

Pearl millets

872

Almeida-Dominguez (HD), Gomez (MH), Serna-Saldivar (SO), Waniska (RD), Rooney (LW), Lusas (EW). **Extrusion cooking of pearl millet for production of millet-cowpea weaning foods.** *Cereal Chemistry* 70(2); 1993; 214-219

Pearl millet was decorticated to yield 91%, milled into flour, and extruded at different moisture contents (12.5, 13.6, 15.0 and 16.3%). Porridges were prepared from extruded millet, press-dried cowpea, and sorghum malt. Although decortication of millet

removed some pericarp and peripheral endosperm, the proximate compositions of millet and some of the essential amino acid content remained constant, whereas the *in vitro* protein digestibility increased. Increased radial expansion, water solubility, and cold paste viscosity was observed in extrudates prepared from decorticated millet under low moisture conditions. A lower degree of mol. dispersion in water at 85°C was observed in extrudates prepared under low-moisture conditions. Porridges prepared from extruded millet and press-dried cowpea had high nutritional quality with acceptable properties of weaning foods (e.g., an intermediate consistency, smooth texture, and pleasant colour and flavour). Treatment with sorghum malt allowed the preparation of more fluid products. AA

Sorghum

873

Babikir (EFE) and El Tinay (AH). **Effect of soaking in water or in sodium carbonate on tannin content and *in vitro* protein digestibility of sorghum cultivars.** *International Journal of Food Science and Technology* 28(4); 1993; 389-395

Investigation of 2 sorghum cvs showed that although the tannin content of untreated seeds were 3.1 and 0.6% for Karamaka and Mugud cvs, respectively, their *in vitro* protein digestibility (IVPD) is very similar (89 and 90% respectively). Extractable tannin content was markedly reduced by steeping whole seeds in water or Na_2CO_3 sol. and by incubating them for up to 24 h at 30°C or up to 20 min at 100°C. With both cvs, the percentage tannin extracted increases with time, temp. and Na_2CO_3 concn., with an increase in the percentage *in vitro* protein digestibility, but the degree of change differed between the two cvs studied. Conditions have been observed which combine a low energy-input, short-time treatment with high protein digestibility of the treated grain. AA

Sorghum starch

874

Young (R), Gomez (MH), McDonough (CM), Waniska (RD) and Rooney (LW). **Changes in sorghum starch during parboiling.** *Cereal Chemistry* 70(2); 1993; 179-183

Sorghum grains varying in grain hardness or endosperm texture (soft and intermediate) and starch composition (nonwaxy and waxy) were parboiled. Whole grain (one vol.) and water (3 vols.) were boiled, soaked for 12 h, and brought to boil again (boil-soak-boil process) or alternatively, soaked overnight and boiled for 10 min (soak-boil process). The grain was dried at room temp. and decorticated. Parboiled kernels were darker, denser, smaller, and harder than non-parboiled kernels. Parboiling decreased starch crystallinity and starch dispersion in hot water. Parboiled grain with soft endopserm texture contained less dispersible and soluble starch than parboiled grain with intermediate endosperm texture. The physical characteristics of the waxy cv. were changed after parboiling; however, starch solubility and crystallinity decreased only slightly. Pasting properties of waxy sorghum were not changed as dramatically by parboiling as were those of nonwaxy cvs. Apparently, the absence of amylose in waxy starch substantially decreased retrogradation of starch polymers. AA

PULSES

875

Sadhana Sharma and Ahmad Salahuddin. **Purification and some properties of *Phaseolus mungo* lectin.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 700-703

Phaseolus mungo lectin in pure form was isolated from seeds by affinity chromatography on a galactosyl Sepharose 6B column. The lectin contained 8.3% netural carbohydrate. It absorbed maximally near 278 nm, and the corresponding maxima in fluorescence excitation and emission spectra occurred, respectively, at 278 and 337 nm. Its elution profile from an analytical Sephadex G-150 column was consistent with a mol. wt. of 137 000 and a Stokes radius of 4.3 nm; the frictional ratio, f/f_o, of the lectin was calculated

to be 1.26. The lectin moved as a single protein band of M_r 66 000in SDS-PAGE under both reducing and nonreducing conditions. The results suggested that the lectin is a dimer whose overall native conformation is nearly globular. From the effect of 10 saccharides on the hemagglutinating activity of lectin against trypsinized rabbit erythrocytes, it was concluded that the lectin was galactose/N-acetylgalactosamine-specific, having significantly reduced affinity for N-acetylgalactosamine. The lectin showed preference for α-glycoside and probably does not contain a hydrophobic binding site. AA

876

Funk (A), Weder (JKP) and Belitz (H-D). **Primary structures of proteinase inhibitors from *Phaseolus vulgaris* var. *nanus* (cv. Borlotto).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(4); 1993; 343-350

The primary structures of two trypsin-chymotrypsin inhibitors from *Phaseolus vulgaris* var. *nanus* (bush bean, cv. Borlotto), PVI-3_2 and PVI-4, were derived from automated Edman degradation data, amino acid composition and manual Edman degradation results of enzymatic fragments and homology with other Bowman-Brik type proteinase inhibitors. The highest degrees of homology were observed between PVI-3_2 or PVI-4 and the trypsin-chymotrypsin inhibitors from lima beans (LBII, IV and IV', 86%), black eyed peas (BTCI, 81%), and in part, adzuki beans (ABI I, II and II', 74-77%). Similarly, the primary structure of the trypsin-elastase inhibitor from the same source, PVI-3_1, was deduced which showed highest homology with that of the trypsin-elastase inhibitor GBI II from garden beans (92%), followed by GBI II' from garden beans (86%) and C-II from soybeans (71%). In contrast, homology between PVI-3_2 and PVI-4 on the one hand and PVI-3_1 on the other was relatively low (61%). AA

Broad beans

877

Danilenko (AN), Dmitrochenko (EE), Braudo (EE), Bogomolov (AA) and Rozantsev (EG). **Restricted enzymatic hydrolysis of legumin of broad beans (*Vicia faba* L.) by trypsin in concentrated solutions. Control of hydrolysis process at the expense of change of enzyme-substrate ratio.** *Die Nahrung* 37(1); 1993; 46-52

Kinetics and mechanism of proteolysis of broad bean (*Vicia faba* L.) legumin by trypsin in concentrated sol. at different enzyme-substrate ratios ((E/S) = 1/40, 1/100, 1/200, 1/1000) were studied. By the method of HPLC it was established that during proteolysis process (E/S = 1/40) take place both protein content decrease in hydrolysate and change of its mol. mass (from 360 to 280 kD), which evidences for the mixed type of proteolysis, including cooperative and non-cooperative mechanisms. Decrease of E/S from 1/40 up to 1/100 - 1/1000 leads not only to unproportional drop in proteolysis rate, but also to decrease of the relative contribution of cooperative proteolysis which is, possibly, connected with the presence in protein molecule of at least two groups of attack sites, differentiating by their affinity with enzyme. Change of enzyme-substrate ratio is accompanied also by change of subunit composition of product of non-cooperative proteolysis ('modified protein') and also of temp. and enthalpy of its denaturation. AA

Chickpeas

878

Barron (JM) and Espinoza (A). **Fortification of maize tortilla with alkali-treated chickpea flour.** *International Journal of Food Science and Technology* 28(5); 1993; 505-511

Critical parameters for the preparation of alkali-treated chickpea (*Cicer arietinum* var. Surutato-77) flour were studied. The alkali-treated chickpea flour was used to fortify a commercial maize flour for tortilla preparation. Fortification levels were set at 5, 10, 15, 20 and 25% (by wt.). Tortillas prepared from the fortified flour blends, were evaluated for their nutritive value and sensory attributes. The alkali-treated chickpeas showed high % digestibility and reduced trypsin inhibitor activity. Fortified tortillas showed a significant increase in nutritive value with improved colour and texture when compared to the maize tortilla (control). AA

Cowpeas

879

Liu (K), Phillips (RD) and McWatters (KH). **Induced hard-to-cook state in cowpeas by freeze-thawing and calcium chloride soaking.** *Cereal Chemistry* 70(2); 1993; 193-195

Cowpeas stored at -18°C and ambient humidity (control) or 30°C and 64% RH (aged) for 12 months were hydrated before being subjected to freeze-thawing (FT) cycles, $CaCl_2$ soaking, or combination of these. The cowpeas were monitored for electrolyte leakage, a possible indicator of cell membrane damage, and for hard-to-cook (HTC) state. Results showed that electrolyte leakage depended on storage conditions and the number of FT cycles. HTC state depended on storage conditions and the number of FT cycles, and the application sequence of FT and Ca^{2+} soaking. For control cowpeas, FT slightly softened seed texture but greatly enhanced the hardening effect of Ca^{2+} soaking applied subsequently. For aged cowpeas exhibiting a certain degree of HTC state, the greatest inducement of hardness was observed with Ca^{2+} soaking alone. Other divalent cations exerted effects similar to those of Ca^{2+} but to a lesser extent. With respect to the number of FT cycles, there was a parallel relationship in control cowpeas between electrolyte leakage after FT and HTC state induced by subsequent Ca^{2+} soaking. This relationship was not observed in aged seeds because of initial high electrolyte leakage during hydration. Overall results suggest that one part of HTC inducement during cation soaking occurs through loss of cell membrane integrity that allows cations to bind intracellular components. AA

Faba beans

880

Schwenke (KD), Dudek (S), Mothes (R), Raab (B) and Seifert (A). **Physico-chemical and enzymatic studies on acetylated protein isolates from faba beans (*Vicia faba* L.).** *Die Nahrung* 37(3); 1993; 258-268

Selected physico-chemical properties of faba bean protein isolate before and after being acetylated have been investigated using analytical ultracentrifugation, SE- and RP-HPLC, viscometry and hydrophobicity measurements using fluorescence probe techniques. The time course of relative chymotryptic hydrolysis rates was followed by means of the TNBS method and RP-HPLC analysis. The extensive decrease of the 11 S and 7 S protein components of the isolate in favour of a low mol. wt. 2 S component after exhaustive acetylation is the proof of the dissociated state of the highly modified derivatives. Both the viscometric measurement and the study of proteolysis breakdown give arguments for a rather unfolded state both of the unmodified and the modified protein isolates. The course of relative chymotryptic hydrolysis rate points to a successive transition from a globular state into a more unfolded one depending on the degree of acetylation. Both the viscometeric data and the hydrophobicity measurements revealed a conformational transition at about 60% N-acetylation. This level of modification corresponds to that where a sharp increase of OH-acetylation takes place. AA

Lupins

881

Trugo (LC), Donangelo (CM), Daurte (YA) and Tavares (CL). **Phytic acid and selected mineral composition of seed from wild species and cultivated varieties of lupin.** *Food Chemistry* 47(4); 1993; 391-394

Mn varied in the range 61-327 mg/100g DM for Lupinus-albus; 1.5 - 38 mg/100g DM between other species; Ca 134-350; Fe 2.4 - 10.8; Zn 2.9 - 17.6; Cu 0.4 - 1.4 and phytate 0.4 - 1.2 g/100g DM with cvs of *L. albus* and *L. cosentinii* presenting the lowest values. Very low phytate : Zn and (phytate x Ca); Zn molar ratios were observed in wild *L. digitatus* (4.4 and 0.3) and *L. pilosis* P23030 (5.3 and 0.3) indicating excellent Zn bioavailability. Phytate : Ca molar ratios of all samples indicate similar or better bioavailability of Ca as compared to other legumes. SD

Peas

882
Bishnoi (S) and Khetarpaul (N). **Variability in physico-chemical properties and nutrient composition of different pea cultivars.** *Food Chemistry* 47(4); 1993; 371-373

High-yielding var. - Bonneville and Arkel, vegetable peas; HFP4 (aparna) and Rachna, field peas were studied. Density ranged from 1.27 - 1.30 g/ml in the cvs. Arkel showed higher hydration capacity, hydration index, swelling capacity and swelling index than field peas. Total carbohydrates were higher and ash, fat and crude fibre lower in field peas. Crude protein values were similar in Bonneville, Arkel and Rachna. Varietal differences in field peas showed no influence on the physico-chemical properties. SD

OILSEEDS AND NUTS

Gorgon nut

883
Jha (SN) and Prasad (S). **Physical and thermal properties of gorgon nut.** *Journal of Food Process Engineering* 16(3); 1993; 237-245

Bulk density, true density, angle or repose, coeff. of friction on metal surfaces, specific heat, thermal diffusivity and conductivity of gorgon nut (*Euryale ferox*) were determined using standard techniques for different sizes of nuts at moisture contents (MC) and temp. ranging from 15 to 60% (dry basis) and 25 to 55°C, respectively. The physical properties varied quadratically with MC. Specific heat increased with moisture and temp. but decreased with the size of the nut; whereas, the thermal diffusivity showed a reverse trend. Thermal conductivity increased with MC but did not follow any trend with temp. within the range of the study. The physical and thermal properties data at various MC and temp. were used to develop equations for different sizes of gorgon nuts. AA

Groundnuts

884
Jambunathan (R), Singh (AK), Gurtu (S) and Raghunath (K). **Amino acid composition, fatty acid composition and levels of protease inhibitors in seeds of wild *Arachis* species.** *Oleagineux* 48(10); 1993; 415-419

Seventeen germplasm accessions, representing 6 sections of genus *Arachis* and 2 groundnut cvs as controls, were grown in pots under uniform conditions at the ICRISAT. The 100-seed mass of wild species was lower than that of cultivated. The relative concn. of protein and essential amino acids in wild *Arachis* species in general fall within the range reported for cultivated groundnut. Oil content in wild accessions was relatively higher than that of cultivated groundnut. Linoleic acid and nutritionally undesirable saturated long chain fatty acids, such as behenic and lignoceric acids, were higher in wild species than in cultivated species. Trypsin and chymotrypsin inhibitors in wild species were higher than in cultivated groundnut. AA

885
Rouziere (A). **Industrial preparation of ready-to-use groundnut seeds: the experience of Senegal. II - Treatment, preservation and field performance.** *Oleagineux* 48(3); 1993; 139-154

Fungicide-insecticide treatment is a key stage in the industrial preparation of ready-to-use groundnut seeds. It ensures effective protection against parasites in stocks and diseases on emergence, thereby providing a double guarantee of a successful outcome of the procedure. However, proceeding with the operation in this countries of the Sahel poses problems, which can only be solved if appropriate products and equipment are used. A suitable procedure also has to be followed for the intermediate storage of treated seeds; the advantages and drawbacks of the 2 procedures available - refrigerated storage and packaging - storage in a modified atm. - are described and compared. The field performance of seeds produced during these trials is then described, according to the results obtained on small holdings and on stations, and an indication is given of the reception they received from users. The article finishes with an analysis of the true

prospects for developing this new procedure in Africa. AA

Mustards

886

Zhang (X) and Brusewitz (GH). **Water absorption by cracked mustard.** *Cereal Chemistry* 70(2); 1993; 133-136

The water absorption rate (WAR) was determined for whole mustard seed and for seed cracked by 7 cracking treatments, including 2 types of mills, 3 roller mill gaps, 2 hammer-mill feed rates, 3 seed-cracking temp. and two soaking temp. The absorption rate was obtained by measuring the amount of water that a sample imbibed from a water source during a given period. The parameters in a logarithmic model for water absorption as a function of soaking time did not vary with the different cracking treatments. The diffusion coeff. computed to be 1.58×10^{-7} cm^2sec for whole seeds, was used in the diffusion equation to derive an equivalent av. particle diam. The equivalent particle diam. ranged from 2.02 mm for whole mustard to 0.50 mm for finely cracked samples. The WAR of mustard was less for larger roller mill gaps and a higher feed rate through the hammer mill. Seed-cracking temp. had no measureable effect on the WAR. Higher soaking temp. produced a higher WAR. AA

Nutmeg

887

Borges (P) and Pino (J). **Preparation of nutmeg oleoresin by alcohol extraction.** *Die Nahrung* 37(3); 1993; 280-282

In the present work an attempt is made to establish the conditions for preparation of nutmeg oleoresin by SOXHLET extraction with ethanol. BV

Rapeseeds

888

Mansour (EH), Dworschak (E), Lugasi (A), Gaal (O), Barna (E), Gergely (A). **Effect of processing on the antinutritive factors and nutritive value of rapeseed products.** *Food Chemistry* 47(3); 1993; 247-252

The antinutritive factors and nutritive value of rapeseed products were evaluated. The reductions in antinutritional factors by heat processing ranged from 47 to 94% for glucosinolates, from 9 to 43% for phytic acid and from 41 to 67% for tannic acid after toasting and autoclaving treatments. Isolation of proteins eliminated 72-95% of glucosinolates, 74-92% of phytic acid and 100% of tannic acid for protein concentrate and isolate. All processes destroyed trypsin inhibitor activity completely. Rapeseed products have a balanced amino acid composition and their proteins are relatively high in S-containing amino acids and lysine. The chemical score and limiting amino acids of rapessed products varied considerably, depending on the type of process. Heat treatment and isolation of proteins improved the *in vitro* digestibility of rapeseed proteins. The essential amino acid index of rapeseed products ranged from 66 to 81%. Rapeseed meal has high levels of riboflavin, niacin and pyridoxine. Riboflavin and niacin are more stable to the heat process than thiamine, pyridoxine and pantothenic acid. Many of these vitamins are lost during isolation of proteins. The meals are rich in Ca, K, P and Mg. Some minerals increased and others decreased during the processing. AA

Sesame seeds

889

Dashak (DA) and Fali (CN). **Chemical composition of four varieties of Nigerian benniseed (*Sesamum indicum*).** *Food Chemistry* 47(3); 1993; 253-255

The var. of benniseed showed high protein content (%) ranging from 17.2 (var. black) to 22.0 (var. yellow), oil (%) ranging from 34.6 (var. white) to 53.8 (yellow), essential amino acids, iodine of oil (%) ranging from 1.2 (yellow) to 110 (var. brown) and saponification values of oil (MgKOH/g) from 178 (yellow) to 191 (brown). They showed low ash content (%) ranging from 4.01 (black) to 10.1 (white), moisture (%) from 4.12 (brown) to 4.73 (black) and carbodyrate (%) from 6.85 (yellow) to 10.3 (brown). Mineral composition of the 4 var. were also given. The

yellow var. is rich in lysine, methionine, cysteine and more useful for oil production. SD

Soy products

Soy milk

890

Nsofor (LM), Uzuegbu (DN), Chukwuma (AK) and Udechukwu (A). **Storage stability of concentrated soymilk: Evaluation of cow milk concentrate and salts' addition and soybean acid-steeping.** *International Journal of Food Science and Technology* 28(5); 1993; 499-504

This paper reports the evaluation of the tropical storage time and stability of sterilized (121°C, 15 min) concentrated soymilk to which cowmilk conc., sodium dihydrogen phosphate and trona (a crude alkaline salt) have been added. The effects of acid-steeping of soybeans on stability of heat-processed soymilk were also compared with those of blanching and alkali-steeping. The addition of skim-milk conc. doubled the soymilk coagulation time (stability). Addition of phosphate produced instant coagulation of soymilk after sterilization, whilst combination with trona extended soymilk coagulation time to 30 h. Steeping with HCl acid or blanching reduced coagulation time to one third of that with alkali-steeping. The longest coagulation time (280 h) was produced by a combined alkali-steeping and simmering treatment. Soymilk pH decreased on coagulation. Destabilization of concentrated soymilk by added phosphate salt is a reversal of the known stability it confers on evaporated milk. AA

TUBERS AND VEGETABLES

Onions

891

Thamizharasi (V) and Narasimham (P). **Effect of heat treatment on the quality of onions during long-term tropical storage.** *International Journal of Food Science and Technology* 28(4); 1993; 397-406

Onion bulbs (cv. Nasik red) were exposed to hot air currents prior to storage to curtail storage losses. Treatments at 80°C for 30 min or 60°C for 1 h resulted in heat damage while temp. of 60°C for 30 min or 50°C for 3 h or 40°C for 48 h did not cause any heat damage to the bulbs. A commercial lot treated at 47, 50 or 53°C for 3 h and another commercial lot treated at 47 or 50°C for 2-5 h, were stored for 4 or 5 months in ventilated polyethylene bags at (1) ambient conditions 20-30°C, RH 50-80% and (2) 21 plus or minus 1°C, RH 60-65%. In general the treated lots had more marketable bulbs, with less incidence of *Aspergillus niger* infection than untreated controls. Factorial experiments using temp. 47, 50 and 53°C with durations of treatment between 2 and 5 h revealed that the temp. and duration of heat treatment had a significant effect on the yield of good bulbs and reduction in microbial spoilage during storage. Treatment at a temp. from 47 and 50°C for a duration between 2 and 4 h gave best results when stored at 21 plus or minus 1°C. The effect of treatment lasted up to 3 months in storage. AA

Root vegetables

892

Bradbury (JH). **Human nutrition and post harvest technology of tropical root crops.** *ASEAN Food Journal* 8(4); 1993; 127-133

This paper compares some major plant food sources (rice, kidney beans, lima beans, mung beans, edible greens, cassava, sweet potato, yam and taro) in human nutrition and nutritional changes during cooking of tropical root crops. The poor performance of root crops during storage is discussed, and post-harvest treatments are considered and other uses of tropical root crops are covered. 36 references. SRA

Carrots

893

Chopra (CS) and Verma (NS). **Osmo-vacuum drying of carrots: Effect of size of pieces on drying behaviour and product quality.** *Beverage and Food World* 21(2); 1994; 7-8

The study indicated that the wt. loss, water loss and non-enzymic browning increased with increase in the size of pieces whereas sucrose gain, rehydration ratio and water content in the rehydrated pieces showed an inverse trend. However, statistically these changes were insignificant. Vacuum drying of large sized pieces required 33% more drying time than the small or medium ones. SRA

Cassava

894

Yeoh (H-H) and Truong (VD). **Quantitative analysis of linamarin in cassava using a cassava β-glucosidase electrode.** *Food Chemistry* 47(3); 1993; 295-298

Linamarin content of 18 cassava var. determined by this procedure which is claimed to be simple and reliable, ranged from 24-395 mg/100 g fresh-wt. root being comparable to those obtained by spectrophometric method for which hazardous chemicals like pyridine is used. A steady state value is obtained in 15-20 min with the limit of detection of 0 mM linamarin. SD

895

Teles (FFF), Del Borges (VE) and Gaspar (JCJr). **An easy technique for rapid determination of dry-matter content in cassava roots (*Manthot esculenta* Crantz).** *Food Chemistry* 47(4); 1993; 375-377

A simple, quick and accurate new method based on common microwave oven and top-load balance for DM in cassava roots is reported. The results are comparable to AOAC method. SD

896

Padmaja (G), George (M) and Moorthy (SN). **Detoxification of cassava during fermentation with a mixed culture inoculum.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 473-481

The efficacy of a mixed culture inoculum in detoxifying intact cassava tuber and peel pieces was investigated. Fermented cassava tuber and peel pieces had more linamarase activity than the non-fermented control samples and this might have resulted partly from the release of endogenous linamarase from the retted tuber/peel pieces and partly due to the microbial linamarase. Approx. 24-26% of the total cyanide remained in the bound form in the fermented tuber while 67-79% existed as bound cyanide in the non-fermented controls. In cassava peels, only 15 - 33% of total cyanide remained in bound form after 72 h fermentation while 58-59% cyanide existed in bound form in the parallel non-fermented control peels. Free cyanide which could be easily eliminated through sun-drying was present at higher concn. in the fermented tuber and peel compared with the non-fermented samples. The study showed that cassava tuber and peel could be extensively detoxified through fermentation with a mixed culture inoculum. AA

Sweet potatoes

897

Morrison (TA), Pressey (R) and Kays (SJ). **Changes in** α- and β-amylase during storage of sweet potato lines with varying starch hydrolysis potential. *Journal of the American Society for Horticultural Science* 118(2); 1993; 236-242

The activities of α-and β-amylase in fresh, cured and stored roots and alterations in reducing cv. Jewel and staple-type sweet potatoes'Samor' are described. The mechanisms by which staple-type lines have repressed starch hydrolysis are explored using polyclonal antibody to sweet potato β amylase. α-amylase and β-amylase activity rose in roots of all lines after harvest and reached max. after approx. 90 days storage. In raw roots, individual and total sugar concn. were significantly higher but only trace amounts of maltose were found in raw roots. SRA

Vegetables

898

Walash (MI), Belac (F), Metwally (ME) and Hefnawy (MM). **Spectrophotometric determination of Maneb, Zineb and their decomposition products in some vegetables and its application to kinetic studies after**

green house treatment. *Food Chemistry* 47(4); 1993; 411-416

The method uses 2,6-dibromoquinone chlorimide (DBO) and 2,6-dichloroquinone chlorimide (DCQ) and depends upon releasing ethylenebis-dithiocarbamate (EBDC) moiety from Maneb and Zineb using ethylenediamine tetracetic acid disodium salt as solvent. EBDC reacts with DBQ or DCQ yielding red colour with max. absorption at 495 nm. Decomposition product ethylene thiourea produces yellow colour with max. absorption at 385 nm. These compounds were successfully determined in cucumber and tomato fruits grown in green houses. The % extraction of Maneb and Zineb from cucumber was 94.5% and from tomato 89.2%. The rate of disappearance of Maneb and Zineb showed a significant positive correlation with the rate of growth of cucumber and tomato. SD

899

Kiranoudis (CT), Maroulis (ZB), Tsami (D) and Marinos-Kouris (D). **Equilibrium moisture content and heat of desorption of some vegetables.** *Journal of Food Engineering* 20(1); 1993; 55-74

The equilibrium moisture content of potato, carrot, tomato, green pepper and onion was determined within the range of 10 to 90% a_w at 3 different temp. (30, 45 and 60°C), using the standard static gravimetric method developed by the European Cooperation Project COST 90. The GAB equation was fitted to the experimental data, using the direct nonlinear regression analysis method and the agreement between experimental and calculated values was satisfactory. The net isosteric heat of desorption of water was determined from the equilibrium desorption data, using the Clausius-Clapeyron equation. An empirical exponential relationship between the net isosteric heat sorption and the moisture content was proposed and validated. AA

Asparagus

900

Hurst (PL), King (GA), Woollard (DC) and Borst (WM). **Nitrogen metabolim in harvested asparagus: No difference between light and dark storage at 20°C.** *Food Chemistry* 47(4); 1993; 329-332

Protein, amino acid and ammonia levels and glutamine synthetase activity in tip sections (3-30 mm) of asparagus spears (*Asparagus officinalis* L. cv Limbras 10) stored upto 48 h in continuous light or dark at 20°C were monitored. The effect of light and darkness was almost identical. Protein increased by 20% after 12 h and declined to the harvest level after 48 h. Ammonia increased slightly by 48 h. Glutamine synthetase activity increased 10-15% by 18 h and declined to 90% by 48 h. Glutamic acid and glutamine were the most abundant amino acids amounting to 42%. Amino acids increased substantially by 48 h with aspargine amounting to 28%. Results indicate that post harvest nitrogen metabolism in asparagus spear tips is not modulated by light. SD

901

Hurst (PL) and Clark (CJ). **Post-harvest changes in ammonium, amino acids and enzymes of amino acid metabolism in asparagus spear tips.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 465-471

Changes in total protein and ammonium levels in harvested asparagus spear tips over 5 days at 20°C were analysed. Total protein ocntent in spear tips rose slightly at the beginning of the post harvest period but steadily declined. Over 5 days 34% of the total protein was lost. Soluble protein declined steadily over 5 days. Ammonium content of tips remained constant over 2 days and increased 2.5 fold over the next 2 days before increasing to 10-fold harvest level by 5 days. Most amino acids increased during storage with a tendency to level off or decline slightly towards the end of the storage period. GS

Cucumbers

902

McDonald (LC), Shieh (D-H), Fleming (HP), McFeeters (RF) and Thompson (RL). **Evaluation of monolactic-deficient strains of *Lactobacillus plantarum* for use in cucumber fermentations.** *Food Microbiology* 10(6); 1993; 498-499

This study was designed to evaluate selected MDC^- and MDC^+ parent cultures of *Lact. plantarum* as to: (1) generation and lag times in broth culture at 0 to 6% NaCl and 15 to 40°C; (2) malic acid decarboxylation, sugar use, and acid formation; and (3) ability of MDC^- cultures to dominate cucumber fermentations. 1 MDC^- strain, designated MOP3-M6, was selected for further development because of its relative dominance in cucumber fermentations, high residual malic acid concn. after fermentation and greater salt tolerance as compared to its closest rival mutant culture. Growth lag and generation times averaged 1.6 and 1.2 times greater, respectivley, for MOP3-M6 mutant than its parent. However, this mutuant may still have application as a starter culture for cucumber fermentation, particularly under relatively aseptic conditions. SRA

Tomatoes

903

Singh (RP), Mital (BK) and Nath (N). **Determination of process time for cold-break tomato juice.** *Beverage and Food World* 21(4); 1994; 20-23

A method is developed to obain a palatable juice by cold-break and to standardise a schedule for its in-bottle processing. Tomato juice, immediately after cold extraction, was boiled for 1 min to inactivate pectin methyl esterase. It was adjusted to 6% TSS using cane sugar, 0.6% citric acid and 0.8% NaCl. Process times for juice were based on F18 = 0.7 min, processing temp. of 240°F and retort come-up time of 6 min. For cold-filled juice it was found to be 11.9 to 12.6 min by formula method and 14.1 to 16.6 min by graphical method. The values for hot-filled juice were 11.9 and 12.6 min respectively. Bottled juice processed for 11 min was sterile and retained their quality well during 90 days storage under ambient conditions. SRA

904

Bolzoni (L), Sannino (A) and Bandini (M). **Determination of ethylenethiourea and propylenethiourea in tomato products and in fruit purees.** *Food Chemistry* 47(3); 1993; 299-302

With this method 100 samples of commercial products - pulp, puree, paste, peeled tomatoes and ketchup were analysed. The residues were extracted with dichloromethane on an extrelut column and clean-up was carried out using a Sep-Pak C18 catridge before injection into a liquid chromatograph with an electrochemical detector (coulometer). The sensitivity of the method is 3 µg/kg for tomato products with a total solids content similar to that of fresh tomatoes and of fruit purees with a soluble solids content of 10°Brix. SD

905

Porretta (S), Poli (G), Rondelli (M) and Zanangeli (G). **Quality evaluation of tomato pulp.** *Food Chemistry* 47(4); 1994; 379-386

For 8 commercial brands of tomato pulp, 26 physico-chemical parameters and 3 sensory attributes were determined. Principal component analysis of data revealed that these physico-chemical parameters contributed to 37% of the variations for acidity, 23% for natural taste and 12% for viscosity. Discriminant analysis of data showed 3 classification of the brands. SD

906

Grubinger (VP), Minotti (PL), Wien (HC) and Turner (AD). **Tomato response to starter fertilizer, polyethylene mulch and level of soil phosphorus.** *Journal of the American Society for Horticultural Science* 118(2); 1993; 212-216

Four field exp. were tried to compare the response of tomatoes to starter fertilizer (SF) in mulched (M) and unmulched (UM) situations that varied in residual P (RP) and the amount of P incorporated before planting. No benefits from SF were obtained on soil with high RP that was moderately fertilized with P before transplanting or on soil with low RP that was heavily fertilized with P. A positive effect from SF was observed only when RP was low and no P was broadcast in M and UM plots. No significant SF by M interaction was obtained in these exp. eventhough M consistently increased shoot P concn. and fruit yield. The M was beneficial even under conditions where UM tomato leaves contained 0.4% P 3 wks after

transplanting that factors in addition to improved P nutrition are also involved in the M effect. SRA

FRUITS

907

Ladeji (O) and Okoye (ZSC). **Chemical analysis of the fruit of *Vitex doniana* (Verbanaceae).** *Journal of the Science of Food and Agriculture* 63(4); 1993; 483-484

Analysis of black plum (*Vitex doniana*) indicated a fruit with useful nutritional value in tropical African diets (crude protein 27.5, lipid 49.5, sugars 842 g kg^{-1} DM; moisture 488 g kg^{-1} FW) and possibly a good shelf-life. AA

Cherimoya

908

Lahoz (JM), Gutierrez (M), Sola (MDM), Salto (R), Pascual (L), Martinez-Cayuela (M), Vargas (AM). **Ethylene in cherimoya fruit (*Annona cherimola* Mill.) under different storage conditions.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 721-723

Southern Spanish coast cherimoya fruits grown in the subtropical valleys were stored at 20 or 10°C. Production of ethylene was dependent on the storage temp. of the fruits, having max. values of 46.2 plus or minus 2.7 µL of ethylene kg^{-1} h^{-1} in cherimoya stored at 20°C and 1.91 plus or minus 0.03 µL of ethylene kg^{-1} h^{-1} when they were stored at 10°C. Effect of ethylene on the ripening of cherimoya are discussed. BV

Mangoes

909

Aina (JO) and Oladunjoye (OO). **Respiration, pectolytic activity and textural changes in ripening African mango (*Irvingia gabonensis*) fruits.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 451-454

Post-harvest changes in fruit firmness, respiration, pectinesterase (PE) and polygalacturonase (PG) activities were followed in African mango fruits during storage ripening at tropical ambient conditions (28 plus or minus 1°C and 68 plus or minus 2% RH). Respiration followed a climacteric pattern attaining a peak of 99.37 ml CO_2 $kg^{-1}h^{-1}$ on the 5th day of storage while full ripeness (colour index - 5) was attained on the 10th day. PE and PG activities increased with progressive fruit ripening attaining their optima on the 5th day (1.8 PE unit) and 10th day (27 PG units), respectively. Fruit firmness decreased as pectolytic activity increased with a concomitant reduction in the deformation force than 49 kPa in the unripe fruit at 25 kPa at the edible ripe stage. AA

Muskmelon

910

Lester (G) and Stein (E). **Plasma membrane physico-chemical changes during maturation and postharvest storage of muskmelon fruit.** *Journal of the American Society for Horticultural Science* 118(2); 1993; 223-227

This paper describes the lipid matrix composition of the hypodermal-mesocarp tissue plasma membranes from ripening muskmelon (*Cucumis melo*) fruit and compares it with changes in membrane permeability, density and ATPase activity. Increased membrane permeability in muskmelon fruit coincides with an increase in total free sterol: total phospholipid ratio and increase in phospholipid fatty acid saturation index of plasma membrane. The postharvest environment (storage at 4 or 24°C) and vapour pressure difference approx. 3.8 fold) affects mature muskmelon fruit membrane permeability. Vandata-sensitive ATPase (EC 3.6.1.35) activity was highest in mature fruit at harvest. SRA

Pears

911

Joubert (E). **Processing of the fruit of five prickly pear cultivars grown in South Africa.** *International Journal of Food Science and Technology* 28(4); 1993; 377-387

In tests of processing 5 cvs of prickly pear fruit, lye-peeling was not effective as peel was partially removed and flesh erosion occurred. When hand peeled fruit were canned in acidified sucrose syrup (20°B) at 100°C for 15 min, differences between cv firmness were observed; fruit firmness decreased with increasing processing time, but increased on addition of 0.25% $CaCl_2$ to the syrup. Canned fruit stored for 22 months were still firm and retained their shape, but yellow to orange colour cvs lost much of their colour by loss of indicaxanthin. The canned fruit developed a gherkin jam-like uncharacteristic flavour. Fruit yielded between 55% and 68% edible portion which contained 65-76% turbid juice with a soluble solids content of 10-14%. The peel contained approx. 10% soluble solids and 4% sugar, mostly fructose and glucose. Pectin methylesterase activity differed slightly between cvs. AA

Strawberries

912

Wilson (RH), Slack (PT), Appleton (GP), Li Sun and Belton (PS). **Determination of the fruit content of jam using Fourier transform infrared spectroscopy.** *Food Chemistry* 47(3); 1993; 303-308

Fruit content in strawberry jam was determined by using dried jam and the potassium bromide pellet technique in combination with simple linear regression and partial least square analysis. Using diffuse reflectance of jam solids washed on filter papers produced spectra of unusual appearance, and thereby indicated the level of fruit content as well as the adulteration. SD

CONFECTIONERY, STARCH AND SUGAR

913

Spiegel (JE), Rose (R), Karabell (P), Frankis (VH) and Schmitt (DF). **Safety and benefits of fructooligosaccharides as food ingredients.** *Food Technology* 48(1); 1993; 85-89

Fructooligosaccharides, naturally occurring sugars as a potential food ingredients, their safety and their use to improve the flavour of unsweeteened low-fat yoghurts is discussed in this article. CSA

Sugar

914

Kapseu (C), Ahmed (A) and Tedga (N). **Contribution to the reduction of loses in a sugar factory - cane refinery.** *Journal of Food Engineering* 20(1); 1993; 45-53 (Fr)

BAKERY PRODUCTS

915

Gelinas (P), Lagimoniere (M) and Dubord (C). **Baker's yeast sampling and frozen dough stability.** *Cereal Chemistry* 70(2); 1993; 219-225

The cryotolerance of 6 commercial baker's yeast strains grown under identical incremental feeding (fed-batch) conditions was evaluated in frozen doughs. Slight differences in survival were observed between yeast strains subjected to rapid freezing rates (about 10°C/min). All strains showed similar cryotolerance at slow freezing rates (about 1°C/min) followed by storage for 12 wks. As part of a collaborative study between 2 lab., 21 commercial baker's yeast samples from 7 trademarks (from which most strains were screened) were compared on the basis of their cryotolerance in frozen doughs. A rapid freezing test (measuring gas production) and 3-month storage tests (measuring gas production, dough proofing time; and bread specific vol.) showed that yeast cell cryotolerance varied greatly among the commercial yeast samples used to prepare frozen doughs. Because of the great variability in cryotolerance among yeast samples, none of the 7 yeast trademarks tested from Canada, France, and the United States was superior to the others. These results show that the major effect on frozen dough stability is the commercial baker's yeast sampling rather than strain or trademark, and they stress the importance of quality control for cryotolerance of the baker's yeast samples used in frozen dough production. AA

916

Oda (Y) and Tonomura (K). **Sodium chloride enhances the potential leavening ability of yeast in dough.** *Food Microbiology* 10(3); 1993; 249-254

When *Saccharomyces cerevisiae* FL2209, a baking strain isolated from commercial compressed yeast, was cultured in YPS medium composed of 2% Bacto-yeast extract, 4% Bacto-peptone, 2% sucrose, 0.2% KH_2PO_4 and 0.1% $MgSO_4.7H_2O$ (pH 6.0), it showed higher leavening abilities in 3 types of doughs compared to those of the commercial compressed yeast, but not in sweet dough. Addition of NaCl to YPS medium resulted in the increase of leavening abilities in all of the doughs tested. Effects of NaCl were further investigated in 7 other yeast strains including 6 *S. cerevisiae* strains and one *Torulaspora delbrueckii* strain. NaCl commonly elevated the leavening abilities of 5-maltose-fermenting *S. cerevisiae* strains in dough without addition of sugar. Sweet dough leavening was stimulated by NaCl in only one strain of *S. cerevisiae*. Leavening abilities of *T. delbrueckii* were reduced when cultured in the presence of NaCl. YPS medium with the addition of NaCl was shown to be available to estimate the potential leavening abilities of most yeast strains. AA

917

Hounhouigan (DJ), Nout (MJR), Nago (CM), Houben (JH) and Rombouts (FM). **Composition and microbiological and physical attributes of mawe, a fermented maize dough from Benin.** *International Journal of Food Science and Technology* 28(5); 1993; 513-517

Home-scale and commercial mawe samples produced in urban Benin were very similar in composition, particle size, dough viscosity, and microbial loads, with titratable acidity 1.2 - 1.4% w/w (as lactic acid); home-produced mawe had a slightly higher pH (4.2), protein, fat, fibre, and ash than commercial mawe. Lactobacilli and yeasts predominated in both. AA

Bread

918

Lues (JFR), Viljoen (BC), Miller (M) and Prior (BA). **Interaction of non-culture microbial flora on dough fermentation.** *Food Microbiology* 10(3); 1993; 205-213

In this study the influence of microbial interactions amongst the different genera and *Saccharomyces cerevisiae* was determined and assessed whether the inhibition of the undesirable organisms resulted in an improvement in fermentation during bread making. The Gram-positive bacteria had a stimulatory effect on fermentation, while Gram-negative bacteria inhibited fermentation. The addition of *Lactobacillus* spp. and wild species of *Saccharomyces* resulted in the most significant improvement in the performance of CO_2 production. The cumulative effect of a mixture representing all the microbial flora usually encountered in bread dough, however, resulting in an increase in fermentation ability. For optimum fermentation and to obtain optimum taste, texture and shelf-life of bread, the undesirable organisms have to be reduced. SRA

919

Martinez-Anaya (MA), Pitarch (B) and de Barber (CB). **Biochemcial characteristics and breadmaking performance of freeze-dried wheat sour dough starters.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(4); 1993; 360-365

Four mixtures (I-IV) of pure yeasts (*Saccharomyces cerevisiae*, *S. fructuum* and *Candida boidinii*) and/or lactobacilli (*Lactobacillus brevis* and *L. plantarum*) were inoculated into wheat sourdoughs, which after 18 h fermentation time were freeze-dried and used as starters (DS). Before their addition to wheat doughs they were rehydrated and reactivated. Besides DS (20% flour basis), bread dough contained instant active dry yeast (0.6%). Biochemical characteristics (production of organic acids, evolution of sugars and headspace composition), and breadmaking performance (fermentative and rheological properties and bread quality) of these doughs were investigated and compared with control doughs (C) without DS. Doughs with DS showed lower gassing power, and pH, and higher total titratable acidity (TTA) than C.

The dough level in the maturogram reached max. values for C and DS (IV) with only lactic acid bacteria. Doughs with DS (IV) also led to lower values for extensibility, and higher resistance to extension in the extensigram. The dymanics of glucose and fructose were faster during fermentation of doughs with DS than for C. The lactic and acetic acid levels were higher in DS-containing doughs, but ethanol and ethyl acetate contents were greater for C. Some bread characteristics (vol., density, pH, TTA, organic acids and sugar contents) were similar for all DS samples, and, except for sugars, significantly differed from those of C. Generally, sensory bread scores were higher for DS breads than for C, mainly for loaf shape, vol., edibility and overall acceptance. Starters I and IV, with the same composition of lactobacilli, showed a similar performance over starters II, III and C. AA

Chapathies

920

Gupta (TR). **Thermal conductivity of Indian unleavened flat bread (*chapati*) at various stages of baking.** *Journal of Food Process Engineering* 16(3); 1993; 227-235

A steady state technique was used to measure thermal conductivity of whole wheat dough (rolled chapati) and bread *chapati* (round disc prepared mostly from whole wheat flour dough) at various stages of cooking. Based on the experimental data of *chapati* at various stages of cooking, a linear equation $K = -0.5677 + 0.01396\ M + 0.005131\ T$ is proposed for conductivity of wheat flour dough and baked *chapati* at moisture levels (M); $35 < M < 50$ and temp. ranges $35 < T < 60$. A separate equation $K = 0.3204 + 0.0091\ M - 0.00805\ T$ predicts thermal conductivity of rolled *chapati* and baked *chapati* at $T > 60^{\circ}C$. AA

Pasta

921

Edwards (NM), Izydorczyk (MS), Dexter (JE) and Billaderis (CG). **Cooked pasta texture: Comparison of dynamic viscoelastic properties to instrumental assessment of firmness.** *Cereal Chemistry* 70(2); 1993; 122-126

Extruded noodles (EN) were prepared from durum wheat semolina of variable protein content to provide a series of samples with a range of cooking quality. Firmness of cooked EN was measured using an Instron Universal Testing Machine and compared with the storage modulus and dynamic viscosity obtained by dynamic rheometry. A strong correlation (r^2 at least 0.87) was found between the Instron values and the rheometer measurements at both optimum and overcooking times, indicating the sensitivity of dynamic rheometry to changes in pasta firmness. The Instron peak force measurement was found to be a more precise indicator of noodle firmness than was peak energy. The rheometer was able to differentiate between samples and to rank the noodle samples in the same order as the Instron did. Although moisture content was shown to have a major influence on the texture of cooked noodles, the differences in moisture between samples were not sufficient to produce the differences measured by either the Instron or by dynamic rheometry. AA

922

Maldari (D) and Maldari (C). **Design and performance of pasta dies.** *Cereal Foods World* 38(11); 1993; 807, 809-810

The article traces the history and development of present-day dies and discusses the considerations in designing dies for pasta production and some factors affecting die performance. CSA

MILK AND DAIRY PRODUCTS

923

Rao (SVN), Kherde (RL) and Sohal (TS). **Adoption of dairy innovations. A review.** *Indian Journal of Dairy Science* 46(9); 1993; 393-400

This paper reviews the studies conducted on adoption of innovations with reference to dairy innovations which may be of interest to all those associated with production, transfer and utilisation of these innovations. Aspects covered are, stages of adoption, extent of

adoption, reasons for adoption or rejection (the technology, farmer, extension agency, infrastructure). 65 references. SRA

924

Sriram Padmanabhan, Archana Chitre and Shastri (NV). **Milk clotting protease isolated from *Dieffenbachia maculata*.** *Die Nahrung* 37(1); 1993; 99-101

Milk

925

Pagote (CN) and Balachandran (R). **Storage stability of acidified milk beverage. I. Lipolytic and proteolytic changes.** *Indian Journal of Dairy Science* 46(9); 1993; 431-434

The thio-barbituric acid, free fatty acids and non-protein nitrogen contents of sterilized (110°C for 5 min) directly acidified milk beverage increased during storage at 5°C and 30°C. The increase being faster for above 3 parameters after 60, 45 and 60 days of storage period at 30°C for samples packed in glass bottles (GB) and metallised polyester/polyethylene pouches (MP/PP). In general, lipolytic and proteolytic deterioration during storage at 30°C in GB compared to the MPPP. Hence MPPP may be prefered over GB for packing directly acidified milk beverage for longer shelf-life. SRA

926

Pagote (CN) and Balachandran (R). **Storage stability of acidified milk beverage. II. Physical and chemical changes.** *Indian Journal of Dairy Science* 46(9); 1993; 435-439

Changes in physical and chemical attributes of directly acidified milk beverage (AMB) were studied upto 120 days of storage period. The sediment content, reducing sugar, total hydroxymethyl furfural content and viscosity increased during storage period, whereas colour (reflectance) and pH values decreased slightly. In general, the physical and chemical changes during storage were noticed to greater extent in the samples which were stored at 30°C in glass bottles than in metallised polyester pouches and stored at 5°C temp. AA

927

Raccah (M) and Geshell (DJ). **The inhibition of *Listeria monocytogenes* in milk by pediococci.** *Food Microbiology* 10(3); 1993; 181-186

The study evaluates and screens the antilisterial activity of pediococci inoculated in milk along with each of 4 strains of *L. monocytogenes*. Results indicated that the commercial culture *P. acidilactici* Pa did not control the growth of *Listeria* OH at 32°C in the milk. There was no significant difference ($P < 0.01$) among the different strains of *Listeria* growing in pure culture (control) in milk at 4.5 and 32°C. The population attained was about $\log_{10}$ 9.0 cfu ml^{-1} after 4 and 6 days respectively. The strain *P. pentosaceus* FBB-61 brought about reduction (> 4.0-log) in population of *L. monocytogenes* V7 after 4 days at 32°C. Regardless of the mechanism of inhibition, the strains of pediococci PAC, PO_2 FBB-1 and L7230 caused decline in the viable members of *Listeria* in milk. SRA

928

Singh (R) and Deodhar (AD). **Quantitative assessment of total bound and free forms of thiamine and riboflavin in cow milk and curd.** *Indian Journal of Dairy Science* 46(11); 1993; 525-528

The total, bound and coenzyme forms of riboflavin and thiamine were determined in the raw and pasteurized cow milk as well as curd made from it by fluorometric procedures. Thiamine in test materials was liberated by treatment with (i) takadiastase + papain, (ii) pepsin and (iii) takadiastase. The milk was pasteurized by holding method. The curd was prepared with *Lactococcus lactis* ssp. *lactis* and *cremoris* and *Propionibacterium shermanii* as starter cultures. Total thiamine contents in raw, pasteurized cow milk and curd were 32.2 plus or minus 0.02 µg/100 ml, 21.96 plus or minus 0.02 µg/100 ml and 21.93 plus or minus 0.01 µg/100 g respectively. Total riboflavin contents were 155 plus or minus 0.06 µg/100 g, 153 plus or minus 0.05 µg/100 g and 2.23 plus or minus 0.06 µg/100 g in raw, pasteurized cow milk and curd, respectively. Free forms of thiamine and riboflavin in the milk were 48 and 68% respectively, whereas 38% thiamine and 32% riboflavin in the milk

occurred in the bound form. Only small per cent of total riboflavin (14.8% as FAD and 17.4% as FMN) was present in the coenzyme forms associated with protein. 52% of the total thiamine in milk occurred in the form of TPP. The % of free forms of these vitamins significantly increased on fermentation. It was concluded that the bioavailability of thiamine and riboflavin may be greater from curd than milk. AA

929

Patel (DA) and Sannabhadti (SS). **Effect of activation of lactoperoxidase system and heating to thermization temperature on shelf-life of buffalo raw milk.** *Indian Journal of Dairy Science* 46(11); 1993; 529-534

Activation of LP system significant extension in shelf-life (at 37°C) i.e. 3 h at 15:10 p.p.m. SCN: H_2O_2 and 6 h at 45:30 p.p.m. SCN:H_2O_2 as judged by CoB test in comparison to buffalo raw milk control (without any preservative) which had the shelf-life of 5 h. LP at 3 times higher magnitude than that proposed by IDF (1988), however, failed to give proportional advantage in prolongation of shelf-life. Thermization heat treatment at 60°C/20 s and 65°C/20 s did not show marked influence on extension in keeping quality of buffalo raw milk with similar conditions of storage. However, relative retardation of acidity development due to thermization heat treatment merits further considerations. Heating to thermization temp. in combination with LP failed to give significant enhancement in shelf-life as compared to LP treatment alone. However, LP followed after heating to thermization temp. showed slightly better inhibitory influence in comparison to other combination. Heating to thermization temp. singly and in combination gave CoB test positive at slightly lower acidity value in comparison to LP. AA

Milk products

930

Adhikari (AK), Mathur (ON) and Patil (GR). **Development of microstructure in acid and heat coagulated indigenous milk products: A comparative scanning electron microscope study.** *Indian Journal of Dairy Science* 46(10); 1993; 477-482

Scanning electron microscopy was carried out on 2 indigenous milk product viz. chhanna and khoa to study their comparative microstructural attributes. Cow milk chhanna showed threaded, smooth protein agglomerates interlinked through thick protein bridges forming numbers small voids in between. However, buffalo milk channa had large, ragged coalesced protein particles, forming a dense, carded cotton like structure with fewer voids. Whereas, khoa had quite different structural manifestations to that of chhanna. Casein whey protein complexes fused denselyt with lactose forming a continuous gritty mass in cow milk khoa, while in buffalo milk khoa the agglomerated, thread-like protein-lactose complexes formed a ragged, loose matrix with numerous voids throughout. Chhana and khoa differed significantly in microstructure mainly due to acid and heat treatments, while the differences in cow and buffalo milk products were mostly due to the dissimilarities in casein micelles size, soluble and micellar proportion of caseins and salt balance in the respective milks, AA

Butter

931

Nadia (AA-Z) and Soliman (HA). **Effect of packing materials on *samna* stability and its fatty acid composition.** *Indian Journal of Dairy Science* 46(10); 1993; 473-476

Results of the study indicated a significant effect of different types of packages (tin cans (T), pottery pots (P), greasy pottery pots (GP), dark glass cans (GC), LDPE cans (LDPEC), PVC cans (PVCC) and lacquered tin cans (LTC)) on the keeping quality and fatty acid (FA) composition of *samna* (pure butter fat). *Samna* packed in PVCC showed highest stability during storage, followed by that packed in GC, LTC, GP, LDPEC, P and T. The relative concn. of total volatile FA, saturated and unsaturated FA was greatly affected by the packaging material at 6 and 12 months storage, while at 18 months the differences between various samples were not detectable due to decomposition of some FA as storage period advanced. SRA

932
Jha (YK). **Use of ultrafiltration in cheese industry.** *Beverage and Food World* 21(2); 1994; 12-14

Membrane process, ultrafiltration (UF) in cheese making, control of retentate composition, effect of UF on milk components, technical problem arising during the conversion of conc. milk into cheese (viscosity of retentate, starter acidity, coagulation of conc. milks) differences between the composition of UF and conventional cheese Ca and whey protein (Ca to protein ratio in UF, extra protein content of UF cheese, influence of whey proteins on the properties of cheese, and denatured whey protein in UF cheese, heat denatured whey protein in UF cheese, UF cheese yields methods by which UF cheese making can increase the yield, whey protein retention and yield, fat retention and yield), var. where UF cheese making is most successful are discussed in this paper. SRA

933
Shantha (NC) and Decker (EA). **Conjugated linoleic acid concentrations in processed cheese containing hydrogen donors, iron and dairy-based additives.** *Food Chemistry* 47(3); 1993; 257-261

Hydrogen donors (butylated hydroxytoluene, propyl gallate, cysteine, ascorbic acid) and dairy additives (sodium caseinate, sweet whey powder and non-fat dry milk) are capable of increasing the conjugated linoleic acid content in processed cheese. Propyl gallate was the most effective hydrogen donor tested, increasing the total and 9 *cis*, 11 *trans* (9c, 11t) CLA contents 1.59- and 1.42-fold, respectively. Among the dairy additives sodium caseinate at a concn. of 6% was the most effective, increasing the total CLA concn. 1.65-fold compared to processed cheese with no additive. Nonfat dry milk and whey powder produced 1.57- and 1.56-fold increases in CLA concn., respectively. Lipid oxidation systems such as Fe^{2+} and Fe^{3+}/ascorbate were also effective at increasing the CLA content in processed cheese. At 500 p.p.m. Fe, the increase in total CLA was 1.56-fold for Fe^{2+} and 1.44-fold for Fe^{3+}/ascorbate. AA

934
Bullens (C), Krawczyk (G) and Geithman (L). **Reduced-fat cheese products using carrageenan and microcrystalline cellulose.** *Food Technology* 48(1); 1994; 79-81

Development of low-fat cheese products that reduce calorie intake and minimize health risks associated with high-fat levels in their diet using carrageenan and microcrystalline cellulose is discussed in this article. CSA

Camembert cheese

935
Tsuda (T), Yamada (M) and Nakazawa (Y). **Study of the distribution of lower molecular weight peptides in Camembert cheese using capillary isotachophoresis.** *Indian Journal of Dairy Science* 46(10); 1993; 489-493

Capillary isotachophoresis (IP) was used to analyze lower mol. wt. peptides (LMWP) and amino acids on 9 samples of Cammembert cheese ripened for 5 wks. A sensitive method was described for the identification of LMWP using IP. The main conditions of analysis were (1) hydrochloric-ethanolamine as the leading sol. at pH 9.3 and 9.5 and (2) 10 mM β-alanine as the terminating sol., the pH being adjusted to 10 by adding barium hydroxide. The TCA soluble total nitrogen content was 183 mg/100 g cheese. The X-16 fraction contained more free amino acids and di- or tripeptides and higher nitrogen content (76 mg/100 g cheese) than the X-12 and X-8 fractions. Values of individual amino acids in peptides in the 3 fractions were measured. Glutamic acid, lysine, aspartic acid, leucine and proline were much higher in a concn. than cystine, tryptophan, arginine, tyrosine, histidine and phenylanine. Similarities in the patterns of distribution of amino acids among 3 fractions were noted. LMWP and amino acids in the fractions extracted showed typical RE values previously described by other investigations. The R_E value 2.0 at pH_L 9.3 correspond to those of glutamic or aspartic acid and the R_E values 3.3, 3.9 (at pH_L 9.3) and 2.9, 3.2 (at pH_L 9.5) in the 3 fractions correspond with those of asparagine

or serine. The R_E values of 5.0 (at pH_L 9.3) and 4.5 (at pH_L 9.5) in the x-16 fraction correspond to those of leucine. 4.9 (at pH_L 9.3), 4.5 (at pH_L 9.5). IP is an appropriate method to use to describe ripening phenomenon in Camembert cheese. The method utilizes differential electrophoretic patterns in analysis of LMWP in fractions extracted from cheese. AA

Cheddar cheese

936

Grazier (CL), Simpson (R), Roncagliolo (S), Bodyfelt (FW) and Torres (JA). **Modelling of time-temperature effects on bacteria population during cooling of Cheddar cheese blocks.** *Journal of Food Process Engineering* 16(3); 1993; 173-190

Differences in cooling rate of Cheddar cheese (CC) from pressing (35°C) to aging temp. (3.5 - 12°C) has been reported to be responsible for flavour variation within a production lot. During aging, starter and nonstarter bacteria contribute extensively to flavour quality. Temp. effects on these bacteria were quantified using cheese from a local processor. At day 1, starter counts were 8×10^7 cfu/g but as aging continued, starter counts decreased and non-starters became dominant. At 35°C, starter counts reached 3×10^6 cfu/g by day 3 and were below 10^6 cfu/g by day 5. At 25, 20, 15 and 12°C, starter bacteria were below 10^6 cfu/g by day 10, 20, 24 and 40, respectively. Nonstarter counts, initially at 10^4 cfu/g, reached approx. 10^8 cfu/g at increasingly shorter times with higher temp. Kinetic analysis of growth in cheese and in a liquid medium suggested the possibility of diffusion growth limitations in cheese. Computer simulations for the growth of nonstarters suggests the individual cooling of small blocks (18 kg) would reduce the contribution of nonstarter counts to CC aging. AA

Dahi

937

Dave (RI), Dave (JM) and Sannabhadti (SS). **Effect of starter culture and total solids on β-D-galactosidase activity during manufacture and storage of *dahi*.** *Indian Journal of Dairy Science* 46(11); 1993; 544-546

Three strains of *Staphylococcus thermophilus*; MD2 (C1), MD8 (C2) and D3 (C3) were used for *dahi* manufacture from 4.5% fat containing buffalo milk adjusted to (T1), 18 (T2), and 21 (T3)% level of total solids by adding condensed buffalo skim milk. T2 and T3 and C1 and C2 were at par whereas they differed significantly from T1 and C3 respectively. However, the reduction in β-galactosidase content at refrigerated storage was < that observed at room temp. storage. SRA

Khoa

938

Ranganadham (M) and Rajorhia (GS). **Low temperature drying of khoa for rural applications.** *Indian Journal of Dairy Science* 46(9); 1993; 425-430

This article deals with the technological considerations used in tray-drying of khoa at atm. pressure for rural application. The process involved standardization of milk to min. of 5% fat, khoa preparation by traditional method, dessication to 20% moisture, comminution to fine particles and tray-drying at 70°C for 4 h. The fat content and drying temp. greatly influenced the physico-chemical properties of khoa powder. Increased fat content in milk elevated the free fat content and improved sensory scores of the product. The 5 hydroxymethylfurfural content and paradimethyl amino benzaldehyde decreased with increased fat content but increased with elevated temp. of drying. SRA

Milk powders

939

Chan (S-H), Gray (JI), Gomaa (EA), Harte (BR), Kelly (PM), Buckley (DJ). **Cholesterol oxidation in whole milk powders as influenced by processing and packaging.** *Food Chemistry* 47(4); 1993; 321-328

The effects of various spray-drying processes (direct-fired heating, high levels of oxides of nitrogen (NO_x); direct-fired heating, low NO_x; indirect electrical heating) and packaging systems (polyethylene pouches and

crimp-sealed glass vials, with and without oxygen absorbers) on the oxidative stability of lipids in whole milk powders during storage were studied. Lipid oxidation, including the generation of cholesterol oxidation products, was greatest in samples processed by high NO_x direct-fired driers. Oxygen absorbers effectively controlled cholesterol oxidation during the 6 month storage period, even in those samples from the high NO_x drying system. There was a positive correlation (r 0.89) between lipid oxidation and the concn. of cholestrol oxides in the samples. It was concluded that the stability of whole milk powders during storage can be improved by using the low NO_x drying processes and by packaging in oxygen-impermeable packaging systems contnining oxygen absorbers. AA

Paneer

940

Pal (MA), Yadav (PL) and Sanyal (MK). **Effect of paraffining on the physico-chemical, microbiological and sensory characteristics of low-fat paneer at low temperature storage.** *Indian Journal of Dairy Science* 46(11); 1993; 519-524

This study showed a highly significant ($P < 0.01$) effect of treatments, storage period and treatments x storage on lactose, tyrosine contents, total plate counts, yeast and mould counts, TBA values, titratable acidity and pH of low-fat *paneer*. Paraffining improved the shelf-life of low-fat *paneer* by more than 10 days during storage at low temp. SRA

Yoghurts

941

El-Abbassy (MZ) and Sitohy (M). **Metabolic interaction between *Streptococcus thermophilus* and *Lactobacillus bulgaricus* in single and mixed starter yoghurts.** *Die Nahrung* 37(1); 1993; 53-58

Yoghurt was manufactured with mixed starter of *S. thermophilus* and *L. bulgaricus* or a single starter of either in the presence or absence of 600 p.p.m. free amino acids mixture (glutamic acid, histidine, cysteine, valine, methionine and tyrosine) and/or 600 p.p.m. of sodium formate. Results showed that acidity, total volatile fatty acids (TVFA), NPN, total free amino acids and soluble tyrosine contents of different yoghurt samples increased gradually during storage at 5-8°C for 7 days especially in the mixed starter yoghurt fortified with free amino acids mixture and Na formate. Organoleptic evaluation showed that the flavour of single strain starter yoghurt with free amino acids mixture of Na formate gave nearly the flavour of control yoghurt samples. However, the mixed starter yoghurt fortified with free amino acids mixture and Na formate gave more acceptable flavour. It could be concluded that addition of free amino acids mixture and/or Na formate to yoghurt stimulated the activity of starter bacteria. Also manufacture of yoghurt using a single starter of *S. thermophilus* or *L. bulgaricus* should be associated with addition of free amino acids mixture or Na formate to yoghurt milk respectively. AA

942

Vickers (ZM). **Incorporating tasting into a conjoint analysis of taste, health claim, price and brand for purchasing strawberry yoghurt.** *Journal of Sensory Studies* 8(4); 1993; 341-352

Taking notes on sensory attributes while preliminary tasting improved the proportion of completing correct re-identification. Liking ratings from memory were as stable as liking reratings by retasting. Taste and health claim showed greatest influence on buying in but not the brand name. SD

943

Tuorila (H), Sommardahl (C), Hyvonen (L), Leporanta (K) and Merimaa (P). **Sensory attributes and acceptance of sucrose and fat in strawberry yoghurts.** *International Journal of Food Science and Technology* 28(4); 1993; 359-369

Yoghurts containing approx. 0.1, 1.5, 3.2 or 5.2% dairy fat were sweetened with 6, 8, 10 or 12% sucrose and flavoured with strawberry jam. The sweetness, fattiness, and sourness of the resulting 16 samples were rated by a lab. panel (n = 14), and the hedonic responses by a consumer panel (n = 41). As expected, the sweetness and fattiness increased with

increasing sucrose and fat contents, respectively. Sucrose enhanced perceived fattiness and fat enhanced sweetness. Sourness was suppressed by both. The sample with 10% sucrose and 3.5% fat received the highest, and the samples with the lowest sucrose and fat contents the lowest, pleasantness ratings. Among the consumers, men preferred high sweetness and fattiness and low sourness, but women did not show any definite tendencies. Although the consumer panel was small, the results demonstrate the importance of segmenting consumers to predict product success. AA

Milk proteins

944

McHugh (TH) and Krochta (JM). **Milk-protein based edible films and coatings.** *Food Technology* 48(1); 1994; 97-103

Reviews the important characteristics of the major types of milk proteins (total milk proteins, caseins, whey proteins) and then relates these to the properties of milk-protein-based edible films and coatings. 44 references. CSA

Casein

945

Szependowski (J), Amarowicz (R), Smietana (Z) and Kozikowski (W). **Extrusion influence on the nutritive value of casein preparations.** *Die Nahrung* 37(1); 1993; 1-4

Effect of extrusion (120°C; 8-12s; extruder S 45-12-10 U) on amino acids and nutritive value of casein preparations in the form of Ca and low-Ca paracaseinates and in acidic form was studied. The following indices were found to decrease slightly: chemical score from the range 57.4-58.8 to 57.2-58.1; essential amino acids from 86.1-88.3 to 84.9-88.1; NPU from 61.4-67.6 to 60.2-66.6; PER from 2.40-2.47 to 2.38-2.45; apparent digestibility from 84.9-87.2 to 84.8-87.2; true digestibility from 90.7-95.3 to 90.4-92.8 and biological value from 66.6-71.0 to 65.8-69.6. Results indicate that the extrusion at 120°C has no significant lowering of the protein quality in the casein preparations. BV

MEAT AND POULTRY

Meat

946

Nicolai (BM), Van Impe (JF), Verlinder (B), Martens (T), Vandewalle (J), De Baerdemaeker (J). **Predictive modelling of surface growth of lactic acid bacteria in vacuum-packed meat.** *Food Microbiology* 10(3); 1993; 229-238

A dynamic model for the growth of lactic acid bacteria on vacuum-packed meats has been constructed. The model consists of a fermentation model and a model for pH changes in the buffered liquid surface layer. Mathematically this corresponds to a system of two differential equations and two algebraic equations, respectively. Some general aspects of the spoilage of vacuum-packed meat such as the typical log-linear growth curve can be predicted using this model. SRA

947

Morehouse (KM), Kiesel (M) and Ku (Y). **Identification of meat treated with ionizing radiation by capillary gas chromatography determination of radiolytically produced hydrocarbons.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 758-763

This paper describes the results of GC analyses for radiolytically generated hydrocarbons in several meat products containing 1-30% fat. Several lipid extraction techniques investigated during these exp. are compared. Data indicating the utility of this methodology to identify meat products (poultry, beef and pork) treated with ionizing radiation are presented. BV

948

Engeseth (NJ) and Gray (JI). **Cholesterol oxidation in muscle tissue.** *Meat Science* 36(3); 1994; 309-320

949

Millar (S), Wilson (R), Moss (BW) and Ledward (DA). **Oxymyoglobin formation in meat and poultry.** *Meat Science* 36(3); 1994; 397-406

The rate of oxymyoglobin formation (blooming) was estimated by reflectance, spectrophotometry and depth of oxygen penetration, of beef and pork *L. dorsi* and chicken breast muscles of normal ultimate pH. Although beef bloomed very rapidly when exposed to air, even at 23°C, pork muscle exhibited little evidence of oxymyoglobin formation at this temp. and no chicken muscle produced oxymyoglobin formation at 23°C. Even after 48 h at 5°C there was little evidence of oxymyoglobin formation in the chicken muscles although formation was evident in the pork samples. After only 24 h storage at 5°C it was apparent that both the chicken and pork muscles oxidised to produce some metmyoglobin at their surface. though hte amount produced was apparently more in the chicken than the pork samples. In most chicken samples held in air at 5°C the predominant pigments were the purple reduced myoglobin and brown metmyoglobin. The implication of these observations in relation to the packaging of chicken portions is discussed. AA

950

Correia (LR) and Mittal (GS). **Selection of fillers based on z_p values of meat emulsion properties during smokehouse cooking.** *International Journal of Food Science and Technology* 28(5); 1993; 443-451

Textural and functional properties of meat emulsions with various fillers were determined in the raw state, and when product-temp. reached 30, 40, 50, 60, 65 and 70°C during smokehouse cooking. The z_p (temp. interval needed to make a 10-fold change) values for several meat emulsion properties, namely moduli of elasticity, hardness, gel strength, and redness were obtained from the reciprocal of the slope of a linear regression of the logarithm of meat emulsion properties as a function of product-temp. Regression models of z_p values of meat emulsion elastic moduli, hardness (first bite) and gel strength were obtained as functions of cold or hot water absorption of filler. The selection of fillers was based on these regression models. AA

Beef

951

Strmiskova (G), Strmiska (F) and Dubravicky (J). **Mineral composition of mechanically deboned beef meat.** *Die Nahrung* 37(1); 1993; 94-96

952

Dickson (JS) and Frank (JF). **Bacterial starvation stress and contamination of beef.** *Food Microbiology* 10(3); 1993; 215-222

953

Reyes-Cano (R), Dorantes-Alvarez (L), Hernandez-Sanchez (H) and Gutierrz-Lopez (GF). **A traditional intermediate moisture meat: Beef cecina.** *Meat Science* 36(3); 1994; 365-370

954

Lefebure (N), Thibault (C), Charbonneau (R) and Piette (J-PG). **Improvement of shelf-life and wholesomeness of ground beef by irradiation. 2. Chemical analysis and sensory evaluation.** *Meat Science* 36(3); 1994; 371-380

Pork

955

Sen (NP), Baddoo (PA) and Seaman (SW). **Nitrosamines in crude pork products packaged in elastic rubber nettings. An update.** *Food Chemistry* 47(4); 1993; 387-390

N-nitrosamines are due to the interaction of nitrite additive in meat and amine additives in rubber that are used as accelerators in curing rubber. Out of 20 pork products analysed, one was negative, 6 contained 12-32 µg/kg levels of N-nitrosodibenzylamine (NDBZA) but no N-nitrosodi-n-butylamine (NDBA) and the others contained NDBA upto 48 µg/kg and NDBZA upto 520 µg/kg. SD

956

Buys (EM), Kruger (J) and Nortje (GL). **Centralised bulk pre-packaging of fresh pork retail cuts in various gas atmospheres.** *Meat Science* 36(3); 1994; 293-308

Products

Ham

957

Boerema (JA), Penney (N), Cummings (TL) and Bell (RG). **Carbon dioxide controlled atmosphere packaging of sliced ham.** *International Journal of Food Science and Technology* 28(5); 1993; 435-442

Commercially produced sliced, cooked, reformed ham in vacuum and CO_2 packs was stored at 10, 3 and -1.5°C. After various periods 3 vacuum and 3 CO_2 packs from each temp. were removed from storage and subjected to microbiological and sensory evaluation. Under mildly abusive chilled storage (10°C), the use of CO_2 in packs offered no advantage over vacuum in respect of retarding either microbial growth or the onset of unacceptable flavour changes. At chilled storage temp. (3 and -1.5°C), CO_2 packaging significantly extended the lag phase before microbial proliferation commenced, but did not extend the acceptable organoleptic life of the sliced ham beyond that attained using vacuum. The use of CO_2 controlled atm. packs cannot be advocated to replace the current use of vacuum packs for sliced, cooked, reformed ham, in terms of extending product storage life. AA

Sausages

958

Palumbo (SA), Smith (JL), Marmer (BS), Zaika (LL), Bhaduri (S), Turner-Jones (C), Williams (AC). **Thermal destruction of *Listeria monocytogenes* during liver sausage processing.** *Food Microbiology* 10(3); 1993; 243-247

Liver sausage emulsion was inoculated with *L. monocytogenes* Scott A to yield an initial population of c.10^9 g^{-1}. The inoculated emulsion was stuffed into large diam., moisture-proof fibrous casings and cooked. Individual sausages were removed as the product reached predetermined internal temp., and duplicate samples were analysed for viable *L. monocytogenes*. The viable count remained unchanged in product heated to 140°F. Product heated to 145°F showed decreased viable counts and at 155°F, no viable *L. monocytogenes* were detected. SRA

959

Rahkonen (S) and Kaitala (S). **The combined effect of cooking and storing temperatures on the quantities of aerobic, coliform and lactic acid bacteria in cooked sausage.** *Food Microbiology* 10(6); 1993; 501-506

A plate-type temp. gradient incubator was used to expose uncooked sausage emulsion to different combinations of cooking (9 levels in the range of 54-69°C) and cold storage (1-11°C) according to a g^2 factorial design. In general low bacterial counts corresponded with high cooking temp. and low storage temp. but overall pattern was not readily predictable. The bacterial counts were plotted against the corresponding cooking and cold storage temp. to give 3-dimensional (3D) maps. A 6-order polynomial model (PM) was fitted to the experimental data. The 3D maps can be used as a model to predict the probable number of bacteria in cooked and cold stored sausages with the help of a PM the combined effect of cooking and cold storage temp. on quantities of coliform and lactic acid bacteria was discovered. SRA

Poultry

960

Patterson (MF), Damoglou (AP) and Buick (RK). **Effect of irradiation dose and storage temperature on the growth of *Listeria monocytogenes* on poultry meat.** *Food Microbiology* 10(3); 1993; 197-203

Results of this study describes mathematically the growth of *L. monocytogenes* which have survived irradiation upto 2.5 kGy. The lag phase was most affected and increased significantly (2.5 - 18.5 days at temp. between 6-15°C) after irradiation dose of 2.5 kGy off-odours due to microbial activity were noticed after 10 days at 4°C, after 7 days at 10°C and after 1 day at 22°C. It was concluded that even if low numbers of *L. monocytogenes* were to survive the irradiation damage would be significant and some of these pathogens

should not be a problem during the shelf-life of the poultry meat. SRA

961

Kijowski (J) and Mast (MG). **Tenderization of spent fowl drumsticks by marination in weak organic solutions.** *International Journal of Food Science and Technology* 28(4); 1993; 337-342

Drumsticks (DS) from spent layer hens marinated in 2% NaCl brine for 72 h to improve 'tenderness' as measured by shear-force, showed reduction of 40% of shear force of the meat. Marinating in 1.5% lactic or acetic acid ((LA)/(AA)) for 72 h reduced shear-force of the *M. gastrocnemius* by 21.7-fold and 8.1-fold, respectively to values comparable to those observed for broiler chicken DS meat. The presence of NaCl in LA or AA marinating sol. reduced the effect. Lower acid concn. (0.5%) in brine and the shorter time of marination (36 h) produced less change. Vacuum tumbling of DS in LA or AA with 2% NaCl for 2 h reduced the shear values of DS *M. gastrocnemius* by -50%, but longer periods had no further effect. Neutralization of the acidic taste of marinated DS meat with corresponding salts of the acids (1.5% sodium lactate or sodium acetate or sodium bicarbonate) reversed the change to an extent dependent on the type of salt used and change in pH level. AA

Chickens

Broilers

962

Xiong (YL), Pescatore (AJ), Cantor (AH), Blanchard (SP) and Straw (ML). **Influence of genetic strain, pH, and salts on cooking properties of processed light and dark broiler meat.** *International Journal of Food Science and Technology* 28(5); 1993; 429-434

The cooking yields of ground breast (light) and thigh (dark) meat of 8 genetic crosses of commercial strains were compared using different pre-cooking treatments. Adjustment of fresh meat pH from 6.0 - 6.1 to 6.4 with 0.5% phosphate increased ($P < 0.05$) the av. cooking yield of processed breast meat from 90 to 93%, and of thigh meat from 79 to 82%. Addition of 2.5% NaCl to the ground meat further improved the cooking yield. Most genetic crosses of broilers differed significantly ($P < 0.05$) in meat cooking yield, which changed similarly with pH and salt adjustments in most strains. Cooking yields of control, pH-adjusted and salt-added thigh meats were positively correlated with each other, but little correlation existed between thigh and breast meats. The results show the influence of genetic cross on meat cooking yield, and indicate the importance of controlling pH and salt content in broiler meat processing. AA

Turkeys

963

Schantz (R) and Bowers (J). **Response surfaces of sensory characteristics for reduced sodium chloride and phosphate salts in emulsified turkey sausages.** *Journal of Sensory Studies* 8(4); 1993; 283-300

Emulsified turkey sausages (ETS) were prepared using varying concn. of NaCl (1.5 - 2.0%), sodium tripolyphosphate (STPP, 0 - 0.5%), and sodium acid pyrophosphate (SAPP, 0 to 0.25%). The sensory characteristics (response variables) of saltiness, soapiness and texture were evaluated using a trained taste panel. Response surface methodology was used to design and analyze this study. Over the levels of STPP and SAPP, saltiness increased as levels of NaCl were increased. When STPP and SAPP were evaluated in combination with NaCl, saltiness increased slightly as levels of STPP were increased; and saltiness decreased as levels of SAPP were decreased. Soapiness increased at low levels of NaCl (1.5%) as STPP increased. Texture firmness decreased as SAPP increased and STPP decreased at low levels of NaCl (1.5%). Results suggest that sensory perceptions in ETS products are a combination of NaCl, SAPP and STPP mixtures. AA

SEAFOODS

Carp

964

Baker (J) and Abdullah (MY). **Changes in bighead carp (*. nobilis*) stored at ambient**

temperature. *ASEAN Food Journal* 8(4); 1993; 149-152

This paper examines the quality changes of bighead carp (*A. nobilis*) fish kept whole at 29-30°C, using chemical assessment and sensory evaluation over 24 h. Total volatile nitrogen (TNV) and thiobarbituric acid reactive substances (TBARS) values had a high linear correlation with storage time. pH changes were insignificant throughout the exp. Sensory evaluation indicated that the fish were acceptable only upto 12 h of storage with a corresponding TBARS value of 4.2 plus or minus 0.5 µmol mol/kg and TVN value of 5.32 mg N/100 g sample. SRA

Shrimps

965

Lin (CY) and Chiang (BH). **Desalting and recovery of flavour compounds from salted shrimp processing waste water by membrane processes.** *International Journal of Food Science and Technology* 28(5); 1993; 453-460

Diafiltration (DF) and electrodialysis (ED) were studied to remove salt and to recover flavour compounds from salted shrimp processing waste water. Using a loose reverse osmosis membrane, the DF process removed about 93% salt, but recovered < 50% of free amino acids and nucleotides. At high operation current density, the ED process removed 85% salt and recovered more than 70% of flavour compounds, and appeared to be a more effective method for recovering flavour compounds from the salted shrimp processing waste water. AA

Fish

966

Steiner-Asiedu (M), Lied (E), Lie (O), Nilsen (R) and Julshamn (K). **The nutritive value of sun-dried pelagic fish from the rift valley in Africa.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 439-443

The analysis of sun-dried pelagic fish of Africa revealed that they are good sources of protein, ash and fatty acids; poor in vitamins A and E; rich in docosahexaenoic acid and eicosapentanoic acid; low in thiamine and pyridoxine and high in niacin, Ca, Zn and Fe and amino acids. Hence its supplementation into weaning diet will meet the amino acid and protein needs of the child. GS

Catfish

967

Huang (Y-W) and Leung (C-K). **Microbiological assessment of channel catfish grown in cage and pond culture.** *Food Microbiology* 10(3); 1993; 187-195

Channel catfish (*Ictalurus punctatus*) grown in cage and pond culture were assessed for bacteria and also microbial changes in pre-packed fresh catfish during refrigerated storage (for 16 day at 4°C) were examined. Cage-raised (CRCF) and pond raised (PRCF) catfish skin surface rinse samples had no significant difference in their bacterial population except for the aeromond count ($P < 0.05$) significantly higher in CRCF. On both CRCF and PRCF bacterial counts were reduced by processing procedures. However, on the 8th day of cold storage both CRCF and PRCF packaged in vacuum bags had lower ($P < 0.05$) bacterial counts than catfish packaged with wrapping. SRA

Cod

968

Ofstad (R), Grahl-Madsen (E), Gundersen (B), Lauritzen (K), Solberg (T), Solberg (C). **Stability of cod (*Gadus morhua* L.) surimi processed with $CaCl_2$ and $MgCl_2$ added to the wash water.** *International Journal of Food Science and Technology* 28(5); 1993; 419-427

Washing cod mince in water containing both $CaCl_2$ and $MgCl_2$ improves the functional properties of the resultant surimi. Gel strength, frozen shelf-life, and colour, important quality factors for the further processing of surimi, were measured after different heat setting regimes for surimi pastes prepared with or without $CaCl_2$ and $MgCl_2$ addition. The surimi was stored frozen for up to 12 months. The positive effect of setting at

low temp. was far more pronounced when the surimi was processed with 7.5 mM $CaCl_2$ and 15 mM $MgCl_2$ added to the wash water. After 12 months of frozen storage, the gel strength of the salt-washed surimi was reduced, but was still higher than the control. The lightness of the cooked surimi model product was reduced when salt-washed. The positive effect of the ions was abolished when lysine, an inhibitor of transglutaminase, was included. Hence, the positive effect of Ca^{2+} and Mg^{2+} ions on the functional properties of surimi may be caused by a transglutaminase-type enzyme present in cod mince. AA

Threadfin bream

969
Yean (YS). **The quality of surimi made from threadfin bream stored on ice for different periods.** *International Journal of Food Science and Technology* 28(4); 1993; 343-346

Surimi gels prepared from threadfin bream (TB) (*Nemipterus tolu*) stored on ice for up to 8 days showed no significant differences in protein, fat and moisture contents, but the yield decreased significantly after 2 days. Protein losses increased, but not significantly. Gel strength (hardness) was still acceptable after 2 days on ice, but then declined rapidly to unacceptable by 4 days on ice. TB should not be kept on ice for more than 2 days for production of surimi of acceptable quality. AA

Products

Surimi

970
Ohshima (T), Suzuki (T) and Koizumi (C). **New developments in surimi technology.** *Trends in Food Science and Technology* 4(6); 1993; 157-163

This review covers modern surimi processing (heading, gutting, deboning and mincing, washing, refining and dehydration and use of additives), glass transition during the freezing of surimi, waste water treatment by pH shifting, ultrafiltration and coagulation, new methods for the recovery of water-soluble proteins from the wash water and new fish sources for surimi production. 60 references. BV

PROTEIN FOODS

971
Schuchmann (H), Hogekamp (S) and Schubert (H). **Jet agglomeration processes for instant foods.** *Trends in Food Science and Technology* 4(6); 1993; 179-183

This paper gives a short overview of the basic principles and mechanisms underlying the jet agglomeration (JA) process based on studies at the author's pilot plant, and provides some general information on plant design. The advantages of JA over other agglomeration methods is also given. 7 references. BV

Infant foods

972
Paul (SC) and Mathur (BN). **Storage related changes in physico-chemical properties of lactose hydrolysed infant formula. A review: Paper II.** *Beverage and Food World* 21(2); 1994; 24-25

Changes in physico-chemical properties such as colour, flowability, reconstitutability, protein and fat profiles of spray-dried lactose hydrolysed infant formula during storage are reviewed in this article. 27 references. SRA

973
Gahlawat (P) and Sehgal (S). **Antinutritional content of developed weaning foods as affected by domestic processing.** *Food Chemistry* 47(4); 1993; 333-336

Four weaning foods viz (i) roasted wheat (70 g); roasted green gram (30 g) jaggery (25 g) (ii) malted wheat (70 g) malted green gram (30 g), jaggery (25 g); (iii) roasted barley (70 g), roasted green gram (30 g), jaggery (25 g); and (iv) malted barley (70 g), malted green gram (30 g), jaggery (25 g) were formulated and tested for the effect of domestic processing. Roasting of raw ingredients decreased 38.9 - 40.8% phytic acid; 44.8 - 48.6% saponin and 48.4 - 51.0% polyphenols. Malting decreased 56.6 - 57.6%

phytic acid; 53.9 - 57.7% saponin and 61.2 - 62.7% polyphenols. Malting lowered the antinutrients more than roasting. SD

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

974

Almela (L), Lazaro (I), Lopez-Roca (JM) and Fernandez-Lopez (Ja). **Tartaric acid in frozen musts and wines. Optimization of Rebelein's method and validation by HPLC.** *Food Chemistry* 47(4); 1993; 357-361

Rebelein's colorimetric method, to determine tartaric acid in thawed samples of frozen musts and wines, was modified by eliminating the activated carbon step and the results compared well with those obtained by cation-exchange HPLC. Precipitated tartrates in the freezing stage were dissolved by acidification to pH 1.0 before colour reaction development or HPLC analysis. SD

975

Drdak (M), Rajniakova (A), Buchtova (V) and Simko (P). **Free amino acid content of various red wines.** *Die Nahrung* 37(1); 1993; 77-78

976

Waters (EJ), Wallace (W), Tate (ME) and Williams (PJ). **Isolation and partial characterization of a natural haze protective factor from wine.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 724-730

This study describes the isolation of haze protective polysaccharide fraction and investigates its properties and the mechanism of its action in decreasing visible haze. Recognition of the presence and the properties of this natural polysaccharide fraction as a haze protective factor (HPF) opens up a totally new method for avoiding protein haze spoilage in winemaking. BV

Non-alcoholic beverages

Coffee

977

Elmore (JS) and Nursten (HE). **The effect of 2-furanmethanethiol upon the flavour of instant coffee.** *International Journal of Food Science and Technology* 28(5); 1993; 531-536

2-Furanmethanethiol (furfuryl mercaptan) is a constituent of the aroma of roasted coffee and the isolated compound has been reported to possess the aroma of fresh roasted coffee. Because instant coffee is less flavoursome than fresh roasted coffee, a series of concn. of 2-furanmethanethiol were added to instant coffee, in order to determine if it would have a desirable effect upon the flavour of the coffee. At no concn. was there a preference for the coffee containing added 2-furanmethanethiol. At concn. of added thiol above 100 parts per 10^9 (100 p.p.b.), in both black and whitened coffee, there was a significant preference noted for the reference sample, which contained no added thiol. The three most used descriptors for the aroma of 2-furanmethanethiol were burnt, then sulphurous, then coffee-like. AA

Fruit juices

Apple juices

978

Deak (T) and Beuchat (LR). **Evaluation of the indirect conductance method for the detection of yeast in laboratory media and apple juice.** *Food Microbiology* 10(3); 1993; 255-262

The technique of indirect conductimetry (IC) was examined to assess growth of 7 yeast species (*Candida glabrata, C. parapsilosis, Debaryomyces hansenii, Pichia membranaefaciens, Rhodotorula glutinis, Saccharomyces cerevisiae, Zygosaccharomyces bailii*) in terms of detection time, max. rate of change in conductance and max. change in conductance in lab. media and apple juice. Results indicate that the indirect method (IM) of measuring conductance has good potential as a technique to detect yeast activity and

growth. Compared to direct conductimetry, IM gives an increased and more rapid conductance change. The method can be applied under a wide range of environmental conditions and does not require a defined medium to enhance conductivity. IC appears to be a promising technique for rapid detection of yeasts in foods and this method can detect yeast populations as low as 10^1 cfu ml^{-} within 48 h at 30°C. AA

Litchi

979

Singh (P) and Singh (IS). **Physico-chemical changes during storage of litchi (*Litchi chinensis*) beverages.** *Indian Journal of Agricultural Sciences* 64(3); 1994; 168-170

Pasteurized ready-to-serve drink (i) pasteurized nectar, (ii) and 0.06% potassium metabisulphite added squash (iii) prepared from litchi were stored for 4 months at room temp. Sensory quality and chemical analysis revealed that (i) and (ii) were acceptable upto 3 months and (iii) upto 4 months. Total soluble solids and total acidity increased in storage, colour turned brown and slightly dark and off-flavour noticed. KAR

Orange juice

980

Shaw (PE), Buslig (BS) and Moshonas (MG). **Classification of commercial orange juice types by pattern recognition involving volatile constituents quantified by gas chromatography.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 809-813

Four types of commercial orange juices were compared by use of a multivariate computer pattern recognition program as either fresh squeezed, pasteurized not from concentrate, single-strength juice reconstituted from concentrate, or aseptically packaged single-strength juice from concentrate. 19 volatile constituents of each juice were quantified by headspace GC for these multivariate analyses. Elimination of 1 and 5 components considered least important generally led to poorer classification. The mean value and range of values quantified for each component in each juice classification are tabulated. AA

Orange juices

981

Thakur (BR) and Arya (SS). **Effect of sorbic acid on irradiation-induced sensory and chemical changes in sweetened orange juice and mango pulp.** *International Journal of Food Science and Technology* 28(4); 1993; 371-376

Gamma-irradiation (10 KGy) of pasteurized orange juice and both blanched and unblanched mango pulp produced off-flavours rendering them unacceptable, and enhanced browning during storage. Sorbic acid (0.1%) completely inhibited the off-flavours and reduced the rate of browning; it also reduced losses in ascorbic acid during irradiation and storage of sweetened orange juice. In mango pulp, sorbic acid did not prevent ascorbic acid loss on irradiation, but did reduce storage losses. Irradiation and storage losses in carotenoids were slight and not influenced by sorbic acid. The pH and acidity of sweetened orange juice and blanched mango pulp did not change on irradiation or storage, but in unblanched pulp acidity increased and pH decreased on storage. Radiolytic degradation of sorbic acid was higher in blanched than unblanched mango pulp; both were more than in orange juice. AA

Soy beverages

982

Singh (N), Singh (D), Chauhan (GS) and Suresh (I). **Some physico-chemical and sensory characteristics of beverage developed from defatted soyflour.** *Beverage and Food World* 21(2); 1994; 18-19

Results showed that the protein content was higher in protein isolate whereas minerals except Na and vitamins were higher in defatted soy flour, indicating the loss of these nutrients during isolation of protein. The soy protein beverage added with milk, cream and groundnut oil did not differ significantly (P -0.05) from each other with respect to their acceptability. It is concluded that an acceptable nutritious beverage can be

developed from defatted soy flour if used in the form of wet protein isolate. Addition of 8% sugar and 0.05% salt made the product more acceptable. SRA

Tea

983

Price (NE) and Spitzer (JC). **Variations in the amounts of individual flavanols in a range of green teas.** *Food Chemistry* 47(3); 1993; 271-276

Nine green tea from China and Japan were analysed. Epi-gallocatechin (EGC) was the most prevalent flavanol but not epi-gallocatechin gallate (EGCG) as previously reported. Equilibrium behaviour of extraction of flavanols and caffeine into aqueous media at 80 and 60°C for Sencha Uji Tsuyu tea indicated that extraction efficiencies are similar to that for extraction of soluble components from black teas. The results confirmed that EGC was the flavanol with highest concn. making it relevant to the current interest in tea flavanols as antimutagenic agents in the treatment of cancer. From the correlation obtained between flavanol and price of tea, price of green teas at auction could be predicted from flavanol content. SD

984

Opie (SC), Clifford (MN) and Robertson (A). **The role of (-)-epicatechin and polyphenol oxidase in the coupled oxidative breakdown of theaflavins.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 435-438

An enzymic in-vitro model tea fermentation system has been used in combination with gradient elution reversed-phase HPLC to study the oxidative breakdown of black tea theaflavins in the presence and absence of (-)-epicatechin. It was found that theaflavin, theaflavin-3-monogallate, theaflavin-3'-monogallate and theaflavin-3,3'-digallate were not substrates for tea polyphenol oxidase (EC 1.14.18.1) whereas (-)-epicatechin alone, or mixtures of (-)-epicatechin and a theaflavin were rapidly converted to a complex mixture of therubigin-like substances. While the chromatographic profiles varied with the identity of the theaflavin precursor each resembled the equivalent profile obtained with a whole black tea liquor. It is concluded that theaflavins are degraded by a coupled oxidation with (-)-epicatechin quinone. It is suggested that thearubigins may form via these pathways during black tea manufacture. AA

985

Bailey (RG), Nursteu (HE) and McDowell (I). **The chemical oxidation of catechins and other phenolics: A study of the formation of black tea pigments.** *Journal of the Science of Food and Agriculture* 63(4); 1993; 455-464

The chemical oxidation of polyphenols has been used to produce black tea pigments. (+)-Catechin, (-)-epicatechin, (-) epicatechin gallate and (-)-epigallocatechin gallate were isolated from convenient sources, their identity being confirmed by MC and HPLC. The oxidation of a mixture of (-)-epicatechin gallate and gallic acid gave an oxidation product of (-)-epicatechin gallate in addition to epitheaflavic acid 3-gallate. The catechins were oxidised chemically and the products analysed by HPLC, the chromatograms being compared with a black tea chromatogram. The reactions gave both resolved and unresolved pigments, and many of the resolved pigments had HPLC retention time close to black tea pigments. Each catechin behaved differently, the chromatograms of the oxidation products from each starting material being clearly distinguishable. Resolved pigments were obtained by the chemical oxidation of other phenolic compounds. This work provides a convenient method for studying the formation of resolved and unresolved black tea pigments. AA

986

Paul (S), Sharma (DK), Sharma (KL) and Misra (SK). **Genetic variability for yield and quality in tea (*Camellia sinensis*) clones.** *Indian Journal of Agricultural Sciences* 64(5); 1994; 314-319

Among the 6 clones of tea (TV 9, TV 18, TV 23, Phoobsering 312, Tukdah 253 and Kangra Local) yield showed max. variability and amino acid N, caffeine N and brightness % showed max. variability. Theaflavin was significantly

positively correlated with total colour and brightness %. Total colour was positively correlated with brightness % and thearubigins. TV 23 was the highest yielder, followed by Phoobsering 312, TV 9 and Tukdah 253. Theaflavin content and brightness of made-tea was excellent with TV 23 and Tukdah 253. All these clones are recommended for growing under Kangra valley, India and for breeding to improve yield and quality. KAR

Whey-based fruit beverages

987

Vojnovic (V), Ritz (M) and Vahcic (N). **Sensory evaluation of whey-based fruit beverages.** *Die Nahrung* 37(3); 1993; 246-251

In this article sensoric evaluation of some whey-based fruit beverages is presented for samples from pasteurized whey permeate and 5 kinds of fruit juices at 20-40% with the addition of some corrigens (sucrose and ascorbic acid at 7 and 10% and 0.2 and 0.4% respectively). Sensory evaluation was carried out be assessors (panel's groups of 5 experts) using scoring system (20-point scale) an weighted factors. The results of investigation showed good sensoric quality of prepared whey beverages and the fact that the permeate obtained as a by-product during cheesemaking can be successfully used to produce permeate-based beverages. BV

FATS AND OILS

Oils

988

Kourmiska (L), Pokorny (J) and Tirzitis (G). **The antioxidant activity of 2,6-dimethyl-3,5-diethoxycarbonyl-1,4-di hydropyridine in edible oils.** *Die Nahrung* 37(1); 1993; 91-93

989

Ledahudec (J) and Pokorny (J). **Effect of nonvolatile oxidation products on sensory characteristics of frying oils.** *Die Nahrung* 37(1); 1993; 97-98

Olive oil

990

Nergiz (C). **The effect of refining processes on the total polyphenol and 1,2-diphenol content of olive oil.** *International Journal of Food Science and Technology* 28(5); 1993; 461-464

The effect of commercial olive oil refining processes on the total polyphenol and 1,2-diphenol content of the oil was investigated. The mean losses of total polyphenols and 1,2-diphenols of the crude oils were 84-87% and 79-88% respectively. There was no difference between the chemical and physical refining processes in reducing phenols in the oil samples. AA

Palm oils

991

Graille (J), Pina (M), Montet (D), Ratomahenina (R), Minier (C), Galzy (P). **Organoleptic study of alimentary pasta enriched with palm oil-based yeast foods.** *Oleagineux* 48(8-9); 1993; 373-376

After optimization of the production of single cell proteins using *Candida rugosa* cultures from crude palm oil used as carbonated substrate, these yeast foods were added at the rates of 3, 7 and 10% into experimental alimentary pasta of hard wheat semolina to enhance the proteic density of the basic product. The hedonistic appreciation test shows that the acceptability decreases with yeast enhancement rate. The descriptive test results give good utterance to this appreciation. However, the process simplicity and the nutritional qualities of the yeasts obtained make this study a project applicable to most countries with deficient protein diet. AA

992

Manorama (R), Chinnasamy (N) and Rukmini (C). **Effect of red palm oil on some hepatic drug-metabolizing enzymes in rats.** *Food and Chemical Toxicology* 31(8); 1993; 581-588

Soybean oils

993

Bhandari (S) and Chandra (S). **Synthesis, characterization and evaluation of chlorinated soybean oil alkyds.** *Indian Journal of Chemical Technology* 1(1); 1994; 45-52

Five samples of chlorinated alkyds (CA), varying in the chlorine content (11.8 - 50.8%) were synthesized to study the effect of chlorine using IR spectroscopy. Study confirmed that chlorine enters only into the aliphatic portion of the alkyd molecule by addition and substitution reactions. Thermal stability of the CA was found to increase with the chlorine content. In general the chlorinated soybean alkyds possessed superior film forming properties as compared to unchlorinated ones except in terms of flexibility and solvent resistance. SRA

994

Miyahara (M) and Saito (Y). **Pesticide removal efficiencies of soybean oil refining processes.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 731-734

Soybeans, soybean flakes, crude oil (CO), alkali-refined oil (ARO), and bleached oil were spiked with 4 kinds of pesticides (dichlorvos, malathion, chlorpyrifos, and captan) and were subjected to roasting, extraction, alkali refining, bleaching and deodorizing under lab. conditions. The pesticide levels in the products and the byproducts were determined immediately after processing. The results indicate: (1) the dichlorvos in the dry soybeans and the oils is decreased markedly at each stage of processing. Malathion in CO and ARO is reduced at the alkali-refining stage. (2) the 4 pesticides were removed or eliminated completely by deodorizing at temp. usually used in commercial practice. BV

SPICES AND CONDIMENTS

995

Suderman (DR). **Selecting flavourings and seasonings for batter and breading systems.** *Cereal Foods World* 38(9); 1993; 689-694

This article reviews the factors (types of batters and breadings, breading characteristics, batter characteristics, substrate characteristics) to be considered in developing batters and breadings and discusses incorporating flavourings (spices, herbs, liquid or spice extractives, artificial flavours) and seasonings into batter/breading systems. CSA

Lemon oils

996

Pino (J), Sanchez (M) and Roncal (E). **Preparation and chemical composition of lemon oil concentrates.** *Die Nahrung* 37(3); 1993; 277-279

Preparation of flavour concentrates from cold-pressed lemon oil by vacuum distillation and to determine the qualitative and quantitative composition of these prepared oils by capillary GLC is presented. BV

Chillies

997

Singh (H), Kaur (S) and Singh (J). **Determination of infection in fruit rot (*Colletotrichum capsici*) of chilli (*Capsicum annuum*).** *Indian Journal of Agricultural Sciences* 63(5); 1993; 310-312

Fruit rot disease in 20 var. of chilli (*C. annuum*) caused by *Coll. capsici* was studied by pin-prick method and the extent of disease resistance determined. The degree of fruit rot was judged by visual observation, and scored on 0-4 scale. Up to the stage of infection, var. did not show difference but at the sporulation stage the susceptible and resistant var. showed the difference. The sporulation in susceptible var. started within 4-5 days of inoculation and reached max. in 7-8 days whereas in resistant var. it started during 4-6 days after inoculation. In susceptible var. the lesions were large with heavy sporulation, and in resistant var. they were small with sparse sporulation. KAR

Coriander

998

Kerrola (K) and Kallio (H). **Volatile compounds and odor characteristics of carbon dioxide extracts of coriander (*Coriandrum sativum* L.) fruits.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 785-790

Volatile components of coriander fruits were isolated by supercritical carbon dioxide (SC-CO_2) extraction at 9 MPa/40°C and analyzed using GC-MS. The composition of SC-CO_2 extract resembled the conventional isolates in the relative amounts of monoterpene hydrocarbons. The oxygenated monoterpernes comprised 80% of the SC-CO_2 and 82% of the LCO_2 extract, linalool being the main compound (67%) in both extracts. The sensory characteristics of the aroma of CO_2 extracts were evaluated and compared with those of freshly ground spice. No major differences in the average intensities of any odour attribute could be found between the coriander fruits harvested in 1990 and 1991. The SC-CO_2 extract was evaluated to be more terpenous and less sweet than the reference (coriander 1990). The assessors described the supercritical extract as the most terpenic and spiciest with some pungency. The aroma of LCO_2 extract was characterized as distinctly pomerance like and sweet, although all odor attributes were evaluated to be less intense than those in freshly ground coriander fruits. AA

Garlic

999

Yan (X), Wang (Z) and Barlow (P). **Quantitative determination and profiling of total sulphur compounds in garlic health products using a simple GC procedure.** *Food Chemistry* 47(3); 1993; 289-294

Main S compounds in garlic viz alliin, allicin, sulphides and the total S compounds could be determined. The procedure is simple and showed nearly 100% recovery when pure alliin and garlic oil sulphides were used. It can also be used to compare the composition of different product formulations. SD

1000

Yu (T-H), Wu (C-M) and Ho (C-H). **Volatile compounds of deep-oil fried, microwave-heated, and oven-baked garlic slices.** *Journal of Agricultural and Food Chemistry* 41(5); 1993; 800-805

Fried, oil-cooked, microwave-fried, baked and microwaved-baked garlic samples (GS) were prepared in this study. The volatile compounds in these GS were analysed by using GC and GC-MS. A total of 41 volatile compounds were identified from these GS. Among these volatile components, diallyl disulphide (DS) and diallyl trisulphide (DTS) were the dominant compounds found in baked or microwave-baked GS. DS, methyl allyl disulphide, and vinyldithiins were the dominant compounds found in fried, oil-cooked, and microwave-fried GS. Oil treatments of garlic favoured the formation of vinyldithiins, and the content of DTS in oil-treated GS was very low. Significant amounts of nitrogen-containing volatile compounds were found in baked or oil-treated GS. These N-containing compounds were mainly generated from the interactions of reducing sugars and flavour precursors of garlic. BV

SENSORY EVALUATION

1001

Moskowitz (H) and Krieger (B). **What sensory characteristics drive product quality ? An assessment of individual differences.** *Journal of Sensory Studies* 8(4); 1993; 271-282

Twenty one fruit pies were evaluated by 98 consumers in the age range of 21-54 yrs. The consumer's overall liking rating is regressed against individual attributes liking. The coefficient M of the linear equation overall liking = M (Attribute liking) + B reflects the relative importance of the individual sensory attribute to the overall quality. SD

1002

Berglund (PT), Lau (KN) and Holm (ET). **Improvement of triangle test data by use of incentives.** *Journal of Sensory Studies* 8(4); 1993; 301-316

77 panelists participated in double triangle test and the economic incentive test with cereal product and 60 panelists performed both the tests with reconstituted drink mix. First the panelists' ability to detect differences was determined and they were distributed according to the same for incentives. The economic incentive test was more effective and discouraged the panelists from guessing and increased the motivation to detect differences. SD

1003

Dijksterhuis (GB). **Principal component analysis of time-intensity bitterness curves.** *Journal of Sensory Studies* 8(4); 1993; 317-328

Time-intensity (TI) curves for one particular object, say bitterness are prone to large individual differences. As an alternative to overcome this problem, a principal component analysis on the matrices of objects by individual TI-curves for each object is performed known as Principal Time Intensity Curves (PTIC). SD

1004

Ennis (DM). **The power of sensory discrimination methods.** *Journal of Sensory Studies* 8(4); 1993; 353-370

The power of a test is defined as the probability that if a specified difference exists it will be demonstrated as a significant difference in the test. A general equation for the power and sample size for discrimination methods - 2 alternative force choice, 3 alternative forced choice, duo-trio and triangular methods is given. Also tables of the psychometric functions for these methods are given. SD

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

1005

Kaneda (M), Hatakenaka (N), Teramoto (S) and Maita (K). **A two-generation reproduction study in rats with methyl bromide-fumigated diets.** *Food and Chemical Toxicology* 31(8); 1993; 533-542

Crj:CD(SD) rats were fed basal (control) diet or methyl bromide (MB) fumigated diet containing 80, 200 or 500 p.p.m. total bromine for 2 successive generations (18 wk for each generation). Compared with controls, food consumption was significantly lower in F_1 parental females of the 500-p.p.m. group during the second half of the dosing period, and F_2 female pups of the 500-p.p.m. group showed lower body wt. throughout the lactation period. No other treatment-related changes were found at any dietary level of total bromide in either parental animals (F_0, F_1) or their offspring (F_1, F_2) for any of the parameters studied (i.e. clinical signs, oestrous cycle, sperm count and morphology, mating, fertility, gestation, parturition, litter size, pup viability, organ wt., and gross or histopathological examination). It was concluded that residues of 200 and 500 p.p.m. total bromine in diets fumigated with MB are the no-observed-effect level and the min toxic level, respectively, for both parental rats and their offspring, and the bromine residues do not affect reproductive performance at dietary levels of up to 500 p.p.m. AA

BIOCHEMISTRY AND NUTRITION

1006

Manas (E) and Saura-Calixto (F). **Ethanolic precipitation. A source of error in dietary fibre determination.** *Food Chemistry* 47(4); 1993; 351-355

Error sources, non-fibre component co-precipitation and incomplete precipitation of soluble dietary fibre (SDF) were studied. Citrus pectins and pectin-organic acid (citric and oxalic) mixtures were dissolved in phosphate buffer and precipitated in 78% ethanol at different pH values. Incomplete recovery of pectins (84 - 89% based on pH of the sol.) and significant co-precipitation of organic acids were observed. SDF values determined in fruits, legumes and cereals by dialysis were higher than the values obtained

by precipitation technique. Present analytical methods show incomplete detn. of SDF. Also gravimetric methods can include a fraction of non-fibre constituents such as organic acids as fibre. SD

1007

Mathews (S), Singhal (RS) and Kulkarni (PR). **Ocimum basilicum. A new non-conventional source of fibre.** *Food Chemistry* 47(4); 1993; 399-401

Ocimum seeds contain a reasonable amount of hemicellulose and cellulose, accounting for their hydrophilic character. They are high in fibre and associated nutritional properties, and can be considered as a new non-conventional source of fibre. AA

1008

Ozierenski (B), Plass (R) and Lewerenz (H-J). **Effects of glucosinolate breakdown products on the hepatic biotransformation system in male rats.** *Die Nahrung* 37(1); 1993; 5-14

The effect of 5-vinyloxazolidine-2-thione (VOT), 1-cyano-3-butene (CYB) and various isothiocyanates on parameters of hepatic phase I and II biotransformation were investigated in male rats after oral treatment for 3 consecutive days. The compounds (except CYB) caused increase in liver wt. and glutathion S-transferase activity. Cytochrom P-450 level and monooxygenase activities were decreased by the isothiocyanates and CYB. Administration of VOT resulted in contrasting response of monooxygenases; reduced aminopyrine N-demethylation and enhanced aniline hydroxylation. Possible mechanisms are discussed. AA

1009

Heredia (A), Ruiz-Guthierrez (V), Felizon (B), Guillen (R), Jimenez (A), Fernandez-Bolanos (J). **Apparent digestibility of dietary fibre and other components in table olives.** *Die Nahrung* 37(3); 1993; 226-233

The apparent digestibility of the main components of the olive (*Olea europaea arolensis*) has been studied using young Wistar rats. An appreciable digestibility of fibre was found (of the order of 31% Neutral Detergent Fibre) and a high digestibility of fats (higher than 60%) and sugars (100% of glucose and 76% of fructose). Some 41% of the protein was digested, a relatively low value when compared with other products. If the diet is previously desalted, the digestibility of the components diminishes. There are significant differences in the digestibility of dry matter, fibre, cellulose and lignin, but not in proteins and fat. AA

TOXICOLOGY

1010

Kahl (R) and Kappus (H). **Toxicology of the synthetic antoxidants BHA and BHT in comparison with the natural antioxidant vitamin E.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 196(4); 1993; 329-338 (De)

The toxicology of the food preservatives BHA and BHT as well as the naturally occurring vitamin E (α-tocopherol) is described. In high dosages all 3 compounds induce in animals impairment of blood clotting, which can be explained by an antogonism with vitamin K. Specific toxic effects to the lung have only been observed with BHT. The other described toxic effects of BHA and BHT are less characteristic and often occur only after high dosage and long-term treatment. However, BHA induces in animals tumors of the forestomach, which are dose dependent, whereas BHT induces liver tumors in long-term experiments. Because there is no indication of genotoxicity of BHA and BHT, all published findings agree with the fact that BHA and BHT are tumor promoters. In contrast to BHA and BHT, vitamin E is not carcinogenic. On the other hand, all 3 antioxidants have also anticarcinogenic properties. The intake of the necessary high doses as for these effects are, however, contraindicated with BHA and BHT because of their carcinogenic effects. The present overview concludes that the concn. of BHA and BHT nowadays used in food, drugs and cosmetics are probably harmless. In addition, vitamin E can also be used in higher doses without the occurrence of adverse effects. AA

1011

Ehlermann (DAE). **Control of food irradiation: A challenge to authorities.** *Trends in Food Science and Technology* 4(6): 1993: 184-189

The need for a more qualitative approach to the inspection of irradiated foods by authorites worldwide is stressed so that the irradiated on a food product will become more meaningful to the consumers. Irradiation regulations in European community member states are compared with international standards. The self controlling nature of radiation processing, radiation quantities used in process control, radiation quantities suitable for official monitoring are discussed. GS

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